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ANNUAL REPORT

OF THE

ASSOCIATION OF ONTARIO LAND SURVEYORS

ORGANIZED 1886. INCORPORATED 1892.

AND

PROCEEDINGS

AT THE

SIXTEENTH ANNUAL MEETING SINCE INCORPORATION

HELD AT

TORONTO

**FEBRUARY 25th, 26th and 27th
1908.**

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THE STEVENSON PRINTING COMPANY
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TORONTO

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Patronize Our Advertisers.

NOTICES.

MEMBERS and others will be supplied with copies of the Annual Reports for 1886, 1887, 1888, 1889, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, or 1908 upon remitting to the Secretary fifty cents for each copy required.

Copies of the "Manual" may also be had from the Secretary, price fifty cents.

Each member of the Association is reminded of the fact that for the next Annual Meeting a good programme is most desirable and to ensure its preparation it is not now too early to bear the matter in mind.

In addition to its use as a library, the Repository now serves as a drafting room for members when copying Crown Lands plans and notes.

Published annually by the Association of Ontario Land Surveyors. Edition, 1350 copies; price, 50 cents.

Patronize Our Advertisers.

PREFACE.

To the Members of the Association of Ontario Land Surveyors.

The Proceedings of the Association at its Sixteenth Annual Meeting are herewith presented.

Respectfully submitted on behalf of the Council.

KILLALY GAMBLE,

Secretary.

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ASSOCIATION OF

ONTARIO LAND SURVEYORS

(INCORPORATED 1892.)

Organized 23rd February, 1886.

OFFICERS FOR 1908-1909.

PRESIDENT.

A. J. Van Nostrand	Toronto.

VICE-PRESIDENT.

Lewis Bolton	Listowel.

CHAIRMAN OF COUNCIL.

G. B. Kirkpatrick	Toronto.

SECRETARY-TREASURER.

Killaly Gamble	Toronto.

MEMBERS OF COUNCIL.

Hon. Frank Cochrane, Commissioner Lands, Forests and Mines.

G. B. Kirkpatrick, Toronto, J. F. Whitson, Toronto.	For Term Ending April, 1911.
P. S. Gibson, Willowdale, C. J. Murphy, Toronto.	For Term Ending April, 1910.
Alex. Niven, Haliburton, H. J. Beatty, Eganville.	For Term Ending April, 1909

AUDITORS.

J. J. MacKay	Hamilton.
A. T. Ward	Toronto.

BANKERS.

Imperial Bank of Canada (Yonge St. Branch), Toronto.

BOARD OF EXAMINERS.

G. B. Kirkpatrick (Chairman).

G. B. Kirkpatrick, Toronto,	For 3 years.
Owen McKay, Walkerville.	
P. S. Gibson, Willowdale,	For 2 years.
Alex. Niven, Haliburton.	
Thos. Fawcett, Niagara Falls,	For 1 year.
T. B. Speight, Toronto.	

Killaly Gamble (Secretary of Board).

Note.—Board meets at Department of Lands, Forests and Mines, Parliament Buildings, Monday, 8th February, 1909.

COMMITTEES, 1908-1909

STANDING

Land Surveying—J. McC. Watson (Chairman), P. S. Gibson, T. B. Speight, W. Galbraith, A. Niven, W. H. Waddell, H. J. Beatty, J. W. Fitzgerald.

Drainage—J. J. Newman (Chairman), Geo. Ross, R. McDowall, Geo. Smith, C. A. Jones, W. M. Manigault, A. S. Code, J. H. Moore.

Engineering—Owen McKay (Chairman), J. Hutcheon, E. B. Barrow, J. G. Sing, A. P. Walker, W. E. McMullen, J. D. Evans.

Topographical Survey—T. Fawcett (Chairman), J. L. Morris, B. J. Saunders, L. B. Stewart, F. L. Blake, C. C. Fairchild, J. N. Wallace.

Entertainment—L. V. Rorke. (Chairman), H. S. Holcroft, C. J. Murphy, Killaly Gamble, T. D. Green, H. L. Esten, A. J. Van Nostrand.

Publication—Killaly Gamble (Chairman), Willis Chipman, A. J. Van Nostrand, J. F. Whitson, H. de Q. Sewell, W. A. McLean.

SPECIAL

Legislation—G. B. Kirkpatrick (Chairman), Jas. Dickson, J. W. Fitzgerald, M. Gaviller, P. S. Gibson, C. A. Jones, A Niven, Jas. Robertson, T. B. Speight, E. T. Wilkie.

Repository and Biography—H. L. Esten (Chairman), C. Unwin, G. B. Kirkpatrick, J. F. Whitson, Killaly Gamble.

Exploration—H. W. Selby (Chairman), J. W. Tyrrell, L. V. Rorke, T. B. Speight, H. B. Proudfoot, W. W. Stull, A. T. Ward.

Polar Research—Willis Chipman (Chairman), L. B. Stewart, O. J. Klotz, Thos. Fawcett, J. W. Tyrrell, J. F. Whitson, J. L. Morris.

Programme of the

Association of Ontario Land Surveyors

(INCORPORATED)

AT ITS SIXTEENTH ANNUAL MEETING HELD AT TORONTO,

FEBRUARY 25th, 26th AND 27th, 1908.

PROGRAMME

Tuesday, 25th February—Morning, 10 o'clock.

AT THE REPOSITORY, PARLIAMENT BUILDINGS.

Meeting of Council of Management.
Meeting of Standing and Special Committees.

Afternoon, 2 o'clock.

President's Address. Thos. Fawcett.
Report of Council of Management.
Report of Secretary-Treasurer, (including Financial Statement).
Report of Board of Examiners.
Report of Committee on Publication.
Report of Committee on Topographical Survey.
Paper—"Some Thoughts on the Origin of Earthquakes." F. W. Wilkins.

Evening, 8 o'clock.

IN MASSEY HALL

Lecture by Commander R. E. Peary, U. S. Navy. "Nearest the Pole."

Wednesday, 26th February—Morning, 10 o'clock.

AT THE REPOSITORY, PARLIAMENT BUILDINGS.

Report of Committee on Repository and Biography.
Report of Committee on Engineering W. M. Davis, Chairman
Paper—"Concrete in Municipal Work," James Hutcheon
Paper—"Reinforced Concrete in Highway Bridges and Culverts." O. McKay
Paper—"Preliminary Location of Curves in the Bush." R. Laird
Paper—"Railway Rights of Way in New Brunswick." W. E. McMullen
Report of Committee on Drainage. A. S. Code, Chairman
Paper—"Drainage and the Drainage Acts." C. A. Jones

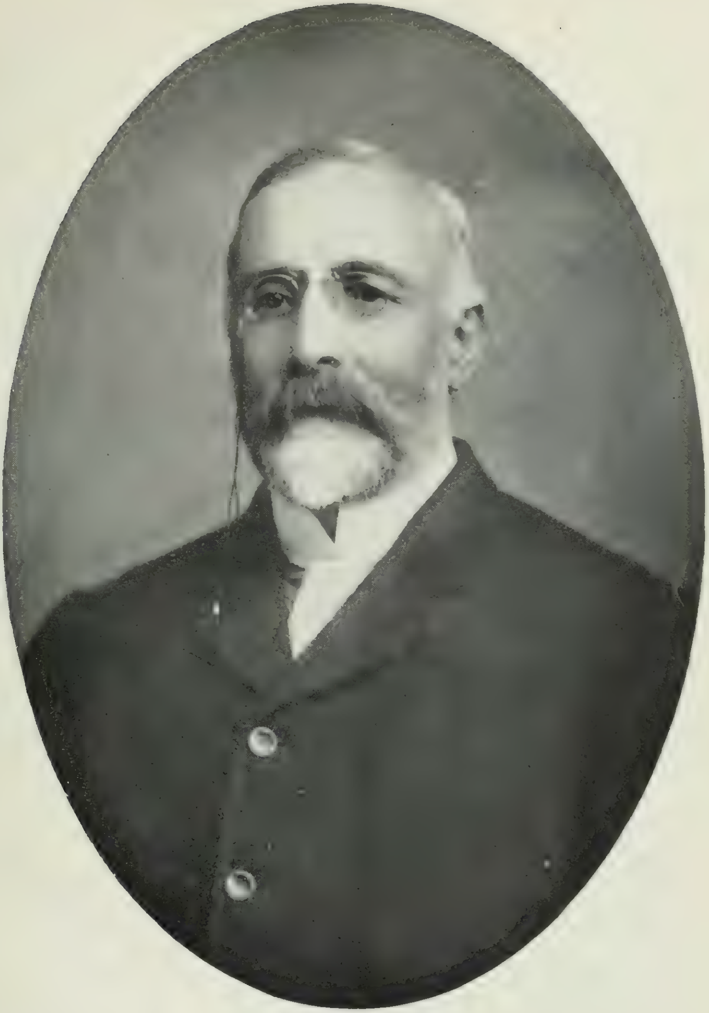
Afternoon, 2 o'clock.

Report of Committee on Exploration.	H. W. Selby
Report of Committee on Land Surveying, and Question Drawer.	J. M. Watson
Paper—"City and Town Lots."	S. Bray
Paper—"Our Timber Resources and Losses by Forest Fires in Ontario."	J. F. Whitson
Paper—"An Old Timer's Holiday."	C. Unwin
Report of Committee on Legislation.	G. B. Kirkpatrick, Chairman

Thursday, 27th February—Morning, 10 o'clock.

AT THE REPOSITORY, PARLIAMENT BUILDINGS.

Report of Auditors.	
Report of Committee on Polar Research.	Willis Chipman
Report of Committee on Entertainment.	Killaly Gamble, Chairman
Paper—"The Peace River District."	H. W. Selby
Nomination of Officers—President, Vice-President, Secretary-Treasurer, Auditors, two Members of Council.	
Unfinished Business.	
New Business.	
Adjournment.	



MR. AUBREY WHITE

Assistant Commissioner of Ontario Crown Lands and Deputy Minister of Lands and Forests from 1887.

Born in Omagh, Tyrone, Ireland, 1845, and came to Canada, 1862. Was for some years engaged in the lumber business in Muskoka District. Entered the service of the Government as a Forest Ranger, 1876; as Crown Land Agent at Bracebridge, 1878; as Chief Clerk in the Woods and Forests Branch of the Crown Lands, 1882, and has been assistant Commissioner and Deputy Minister since 1887.

Mr. White, during his long association with Land Surveyors, has been at all times a warm friend and his presence at the annual gathering of the Association is always welcome.

Minutes of the Sixteenth Annual Meeting

—OF THE

Association of Ontario Land Surveyors

HELD AT THE REPOSITORY, PARLIAMENT BUILDINGS,

ON THE 25TH, 26TH AND 27TH FEBRUARY, 1908.

At 2.30 o'clock p.m. the President called the meeting to order, and said:

Gentlemen, as we have an important meeting this evening, and quite a long programme before us, I think we had better proceed to business. The first item on the programme is the President's address, and as I am not accustomed to speaking in public in the ordinary way, I will read the few remarks which I have written.

Mr. Kirkpatrick—I notice you refer to Australia and New Zealand and Cape Colony as foreign countries. I would respectfully suggest that the term "sister colonies" be substituted.

The President—I will adopt your suggestion.

Mr. Kirkpatrick—I think this Association should make some representation to the Dominion Board of Examiners, urging them to utilize that section of their Act regarding examination in a more generous spirit than appears to be shown by the remarks of the Surveyor-General of the Dominion. I wrote to him about this when the question first came up, and I pointed out what the President had said, that the standard of examinations in Ontario was higher practically than that of the Dominion, and, in fact, that it required a knowledge of a great many subjects that the Dominion Land Surveyor did not necessarily have to know anything about. He replied that he did not consider that the examinations in any of the Provinces were sufficiently high; the best thing to do would be to appoint a Dominion Board covering all the Provinces. I wrote to every one of our Senators, sending them a copy of the examination which the Ontario Land Surveyors had to undergo, and I pointed out to them this clause in the Dominion Act, and said that there was nothing to be taken exception to but the footnote that had been put in. I then pointed out that to say it was "only proposed to admit surveyors from Cape Colony, Australia and New Zealand, where the examinations were high,'' was a direct slur upon our Provincial Boards. I wrote to Mr. George McPhillips, who is interested in the Manitoba Board, and I sent him a copy of the Act, and he replied to me that they were taking action there, but he didn't know exactly what they would do in the matter. He is not now an active member of the Association, as he is employed on the C. P. R. permanently, but he said they would do what they could, but they hadn't interviewed any of the Dominion Senators there. The matter came up in the Senate, and Senator Kerr introduced a motion that the examination should be reciprocal in the different Provinces, but his resolution was voted down. Senator Sutherland, of Kingston, said he thought no good man would shirk an examination. I would like to know whether Dr. Sutherland, who is not a young man now, could come up and pass the examination he had passed forty years ago. He would probably be plucked, although he is a very distinguished Doctor now. I heard the other day from the Honorable G. W. Ross. He wrote me that the Surveyors' Bill passed the Senate with the elimination of Clause 32. He said he had made an effort to get an amendment to the Bill by which Provincial Surveyors, on passing an examination in the Act, with regard to Dominion Surveys, should be admitted to the standing of Dominion Surveyors without any further examination, but the Secretary of State strongly opposed any amendment, so the clause remained as in the original Bill. I think this Association should send a strongly but politely-worded letter to the Dominion Board of Examiners. Dr. Klotz is one, and Captain Deville is another, and I think Dr. King, and I am sure Dr. Klotz will take a proper view of the matter. Captain Deville said all those surveyors who had passed before 1872 and become associated with Dominion Surveyors were not qualified, and I think it quite possible, if some of the older men were to go up for the Dominion Land Surveyors' examination, they would not pass; but to say that the younger men who have passed a first-class examination here could not get through seems nonsense to me. I have heard of young men who read the Dominion manual on the train going from here to Ottawa for the first time, and on getting to Ottawa passed the examination with flying colors. Now, no man has ever passed the Ontario examination who only read the Survey Act as he came up on the train; of this I am quite confident!

Mr. P. S. Gibson—It occurs to me there may be a little feeling in the matter on the part of Capt. Deville.

The President—Was the matter brought up at all at the Dominion Association meeting?

Mr. Selby—No.

The President called for the report of the Council of Management, but as the report was not yet prepared, it was left to be brought on later.

The President called for the report of the Secretary-Treasurer.

The Secretary—The programme has been altered a little this year. The report of the Council of Management should include the Financial Statement.

The receipts for the past year have been larger than usual, but I regret to say it has been due in a measure to the efforts of our solicitors, who have been obliged to take legal steps to collect the fees in the case of many of our members.

It was moved by Mr. Van Nostrand, and seconded by Mr. Brown, that the Financial Statement be submitted to the Auditors and the whole report be dealt with later.

The President put the motion, which on a vote having been taken, was declared carried.

The President called for the report of the Board of Examiners.

(Report read by Mr. Kirkpatrick).

Mr. Kirkpatrick moved, seconded by Mr. Gibson, that the report of the Board of Examiners be received and adopted.

The President put the motion, which on a vote having been taken, was declared carried.

The President called for the report of the Committee on Publication.

(Report read by the Chairman).

The Secretary—I have tried repeatedly to get advertisements from different firms, but I find my efforts are not very successful. They always have something to urge against advertising. I think a professional agent might do much better. Of course we would have to give him, for the first year at least, a large percentage of the amount collected.

Moved and seconded that the report be received and adopted, and the President declared the motion carried.

The President called for the report of the Committee on Topographical Survey, but as Mr. Stewart was not present the matter was left over to be taken up at another session.

The President—Mr. Wilkins is not here, but he has sent me his paper on "Some Thoughts on the Origin of Earthquakes," and I will read it.

The President announced the arrival of some catalogues of E. R. Watt & Son, instrument makers in England, and stated that a branch office had been opened in Winnipeg, where repairs would be made. Mr. Watson mentioned that this establishment had been found most efficient for repairs by Ontario Land Surveyors passing through Winnipeg.

The President called for the paper by Mr. Laird, entitled, "Preliminary Location of Curves in the Bush."

The President—This paper is an important one, and when it is printed we will be better able to go into it thoroughly and see the real value of it.

The President announced Mr. Peary's lecture, to be followed by a supper in the great explorer's honor.

The meeting then adjourned till the following morning at 10 o'clock.

MORNING SESSION, WEDNESDAY, FEBRUARY 26TH, 1908, 10.30 A.M.

The President, Mr. Thos. Fawcett, called the meeting to order and said: Gentlemen, as the Chairman of the Committee on Repository and Biography is not here, and Mr. Davis, who is Chairman of the Engineering Committee is absent, we will take the next paper on the programme, "Concrete in Municipal Work," by Mr. James Hutcheon. (Applause).

The President—As there is another paper on the same subject, it would be well, perhaps, to have it read at this stage; it is a paper by Mr. Owen McKay on "Reinforced Concrete in Highway Bridges and Culverts." Mr. McMullen will read this paper and then the two can be discussed together.

Mr. McMullen—Mr. President and Gentlemen, I am sorry I have not had an opportunity of reading this paper over first. However, it is typewritten, and I trust I will be able to read it intelligibly.

The President—Gentlemen, the two papers that you have listened to are now before you for discussion. They are very practical papers from an engineering point of view, and there are some valuable hints for the members of our profession engaged in that kind of work.

If there are no further remarks, we will proceed with the next paper on the programme, that is, Railway Rights of Way in New Brunswick, by Mr. W. E. McMullen.

Mr. McMullen then read his paper.

The President—Gentlemen, you have heard this delightful paper, interesting and instructive, just such as we like in our Report. It is now open for remarks.

The President—This is a subject in which most of the gentlemen present have had considerable experience; if there are any other remarks we will be glad to hear them.

The President then called on the Chairman of the Drainage Committee to present his report.

Mr. A. S. Code presented the report.

The President—Gentlemen, you have heard the report of the Drainage Committee, what is your will with reference to it? It is open for remarks from those interested in the subject of drainage. There is another paper which comes under this part of the programme this forenoon, and that is "Drainage and the Drainage Acts," by Mr. C. A. Jones. Mr. Newman will read that paper, and any discussion can come on, after lunch.

Mr. Newman then read the paper.

The President—It seems too bad that we have had those two valuable papers when so many of the members who are engaged in that kind of work are not present at this particular time of the day. Our programme for the afternoon seems to be pretty well filled. There are two or three present here who would give us their ideas on these papers if we would remain a few minutes longer. The Chairman of the Drainage Committee comes from a part of the country where there is a good deal of it and has done a great deal of this work; and Mr. Bolton there, I guess, has been engaged in that kind of work to a considerable extent, and perhaps some others will give us some ideas.

Mr. Bolton—It is getting rather late and I have not very much to say.

12.45 p.m. Adjourned to 2.30 o'clock p.m.

AFTERNOON SESSION, WEDNESDAY, 2.30 P.M.

The President called the meeting to order, and said: The first thing on our programme this afternoon is the report of the Committee on Exploration. Mr. Selby will give us that report.

Mr. Selby—Mr. President and Gentlemen: This report is not a regular report of the committee; we could not get the committee together owing to the absence of our Chairman (Mr. Speight), and Mr. Niven is not here, so we have been unable to have a meeting.

The President—If there be no remarks on this report, I will declare it adopted.

The next item on the programme is the report of the Committee on Land Surveying, by Mr. Watson.

The President—We have another paper touching the same subject.

Mr. Watson then read the paper.

The President—Is there any further discussion on these papers? Mr. Watson has demonstrated his position pretty fully as he went along in reading his paper. As to the Question Drawer, I think it is usual for the Committee on Land Surveying to submit the questions in the Question Drawer with their answers attached, and then when it comes before the general meeting the gentlemen who do not agree with the answers are at liberty to attack them.

Mr. Watson—I don't know whether that is the order or not, but if those things should be put in you have got to have some machinery to make the committees meet. Mr. Fitzgerald is the only man present on that committee. Until a month ago, when I got notice, I didn't know I had anything to do with the committee. As far as the whole Association is concerned, I think the committees should meet here three days ahead of the Association meeting and thresh out these things, instead of coming down here when the business is up for discussion with no time to discuss anything. In fact, the meeting is too short for what is in front of it. You read papers, and unless the members have a lot more intelligence than I have they can't discuss them. Those committees should meet, in my opinion, and should discuss these things and get something in form. There is a lot to be done in legislation and a good many other things, but you can't do it in a minute.

The President—We all agree with what Mr. Watson has said, and it has before this been suggested that the papers read at one meeting might profitably be discussed at the next.

Mr. Watson—If it were a question of allowing them their expenses, I think it would pay the Association to do it. There is too much matter to discuss in the time devoted to it, in my opinion.

Mr. Green—With regard to this Question Drawer, while I am an old Provincial Land Surveyor, yet I am a junior in the practice of it; as you know, I have been practising Dominion land surveying. Now these questions are all very practical, but outside of the first question there is not an answer given to a single question.

Mr. Watson—I think that would come under what I said. There is no practical discussion. It should be discussed in committee.

Mr. Green—That is what I say. The President and you have just mentioned what I spoke about. These questions, I presume, will come out in the report, and the discussion, and if there is no answer to the questions. Of what benefit is it?

Mr. Van Nostrand—There seems to me to be a good deal of misunderstanding about this matter. In the past, and I think right up to the present time, these questions that have come before the different committees have been taken hold of by the committees themselves and threshed out and answers given, and the answers have been read with the questions and then discussed by the Association. I don't know that it has been customary to take a vote and amend the answers, but it appears pretty clear usually as to whether it is the feeling of the Association that an answer is correct or not. In this case the answers have not been given, and it seems to me we have been spending our time rather fruitlessly, but it arises from a misunderstanding of the way matters should be conducted. With regard to the assembling of the committees here in advance of the Association meeting, I am afraid that is scarcely practicable with the funds that the Association have at their disposal, and we must cut our coat according to our cloth. If the chairman of each committee takes the matter seriously he has usually notice in April, when he is appointed, that he is chairman of a certain committee, and the members are so and so. Occasionally these notices may not reach him, and it may be so in this case. But in any case, if he is interested in the work he has it all published in the report. On the first pages of the report the committees are set forth, and if we were all in earnest and looked over them, we would see where we belonged and what our duties were to the Association. Then the chairman, of course, having the chief responsibility, would submit these questions by correspondence to the different members with suggested answers, or ask for opinions, and I think in that way we would be able to get pretty definite results. I know I have seen land surveying committees here, sometimes in the presence of outsiders, taking in men who are not members of their particular committee, and discussing the questions thoroughly in the ante-room and then producing the questions with the answers. The chairman has not been familiar with the way that work has been done in the past, and could not be expected to exactly follow the routine, but I think the old method works out fairly successfully, and then as a result we have answers to these very interesting questions which have the approval of the members here at the meeting. That is, of course, the only way to get benefit from them. The discussion is of a desultory character usually, and, as Mr. Green says, there is nothing definite at the end, unless there is an answer which is either upheld or amended. I would suggest in this case, since the discussion has taken place, the chairman should be asked to put down the answers that seem to have resulted from the discussion and from the work of the committee, and that will be probably the best we can do, and will be pretty satisfactory, too, and those answers could appear in the published report.

Mr. Watson—I don't think, as far as the Question Drawer is concerned, that the answers have been satisfactory at all; and as far as correspondence is concerned, a person is very often busy, but I think it would pay for this Association to have their committees meet time enough before the meetings to discuss these matters. I came down here yesterday, expecting to meet my committee. I didn't know I was on that committee before, because I had not examined my report minutely enough to know. I didn't know I was on any committee until Captain Gamble notified me of the date of the meeting. However, I think this Association can well afford to have its committees meet beforehand, and then they might do something, instead of having so much discussion that is very largely fruitless.

Mr. Van Nostrand—The committees are carefully selected by the Council, and of course we all know they are very busy men and have their own affairs to attend to, and a great many do not take the matter seriously, and it is only when they come to the meeting that they drop their own affairs and attend to the affairs of the Association, and that is natural, though I think it would pay the individual members and the Association as a whole to take a more active interest than has been the case in the past.

Mr. Watson—How would it be if I were to correspond with the members of the committee and find out what their opinions are?

The President—If Mr. Watson will do that, and have the answers incorporated in the report, I think that will be better.

The next paper on the programme is one on "City and Town Lots," by Mr. S. Bray, which will be read by Mr. MacKay.

Mr. MacKay then read the paper.

The President—Are there any suggestions on the contents of this paper?

Mr. Van Nostrand—I think, Mr. President, Mr. Bray's is a valuable suggestion, and some steps should be taken to have a measure introduced in the statute whereby an officer of a municipality should first revise the plan before it is put in the Registry Office if it departs from certain limitations. That is to say, put the lots on the same footing as streets now are. Of course, as regards the height of buildings, it is within the power of the municipality to enact a by-law regulating the height, and that we have already machinery for. I don't see that we require anything further, but if the Legislation Committee would take up the matter and make a suggestion to the Legislature here, I think something could be done in the matter. I move, seconded by Mr. Bolton, that the paper be received and published in the Proceedings.

The President—The next paper is one by Mr. Whitson on "Our Timber Resources, and Losses by Forest Fires in Ontario." (Applause).

Mr. J. F. Whitson then read his paper.

The President—The Association is very much indebted to Mr. Whitson for the very valuable, complete and exhaustive papers which he has prepared for us year after year, and I am sure we will appreciate Mr. Whitson's kindness and the trouble he has taken in getting together this information for our benefit, and it adds much to the value of our Reports. If there is any gentleman who wishes to make any remarks on this subject, we will give him a few moments.

Mr. Selby—I move that this valuable paper of Mr. Whitson's, which we have listened to with a great deal of interest, be received and printed in the Proceedings of the Association. Mr. Whitson is deserving of the thanks of this Association for the labor he has devoted to it.

Mr. Bolton—I have very much pleasure in seconding the motion. I am sure we have all listened with very much interest to Mr. Whitson's paper.

The President put the motion, which was carried amid applause.

The President—I see we have with us Prof. L. B. Stewart, and he is Chairman of the Committee on Topographical Surveys.

Mr. Stewart—I am sorry I have not my report in shape yet. I didn't know until yesterday I was chairman of the committee, and I have been busy ever since in collecting material, and I hope to have it ready for the Association before it disperses; if not, I will be able to get something in shape and send it round to the members of the committee, who may send back their remarks and suggestions and then the report can be got ready for publication.

The President called on Mr. Unwin to read his paper on "An Old Timer's Holiday."

Mr. Agar—My uncle has asked me to read this paper for him, which I am very glad to do.

The President—We have listened to this paper with very great pleasure, and I am sure it will be read in the Report with interest. We enjoy these papers, especially from these old timers. It is open for any gentleman to make any remarks with reference to this paper. We are very much indebted to Mr. Unwin.

Mr. Van Nostrand—Mr. Chairman, this paper has been particularly interesting to me. I know some of the spots, though I have visited them much more recently than Mr. Unwin. I can vouch for the fact that the University is not there. There are not many of us in the room here who will be able to go back, after an absence of 59 years, and visit the scenes of our earliest experiences in land surveying; in fact, I doubt if there are any of us; and in addition to that 59 years we look forward to a good many years of good, honest work from Mr. Unwin in the practice of his profession. He entered it on the 12th April, 1852; he has planted a great many stakes since that time, and even to-day, when we come across his stake and are told it is Mr. Unwin's, and that he planted it to mark a certain corner, we usually drop enquiry and go ahead; we use that stake. I have much pleasure in moving, seconded by Mr. Whitson, that the paper be received and printed in the Proceedings.

The President put the motion, which, on a vote having been taken, was declared carried.

Mr. Van Nostrand—If the report of the Committee on Repository and Biography is still open for discussion, I would move that it be taken as read and printed in the Proceedings.

The President put the motion, which was seconded by Mr. Esten, and on a vote being taken it was declared carried.

Mr. Van Nostrand—I understand this report will contain a suggestion that some of the biographical sketches which that committee has been collecting for many years—sketches of the older members of the profession in particular—be published in some form in our Proceedings. I would move that the Publication

Committee be authorized to publish a limited number of those sketches annually.

Mr. Esten—I second that motion. I think we have collected quite a few biographical sketches, and whenever I have written to the older members of the profession, and they have generally responded, they thought evidently that it was with the idea that the sketch should be published at once in the Proceedings. As a matter of fact, we have only made use of them as obituary notices, and it is not very pleasant for the committee to write for such sketches to the men themselves, and I think we ought to certainly publish some of them every year.

The President put the motion, which, on a vote having been taken, was declared carried.

The President called on Mr. Kirkpatrick to present the report of the Committee on Legislation.

Mr. Kirkpatrick—I could report verbally for the Committee on Legislation and put it in writing afterwards. Some time last December I wrote to all the members of the Legislative Committee and pointed out to them that now is a good time to let us know of any amendments that would be required to be made in the Survey Act, on account of the revision of the statutes. I only got two or three replies; none of the others have answered yet. Mr. Fitzgerald replied that he thought in the Registry Act there was a word which, if added, would improve the meaning of that particular section, which was to put the word ''astronomic'' before the word ''course'' in preparing plans for the Registry Office. Mr. Wilkie made a proposal, but unfortunately he is going to tell me what it is to-morrow; and Mr. Speight made a proposal that some definite explanation should be given as to what ''proof lines,'' in Section 26, were. I am sorry to say I have not been able to find out just what he wants. I thought the proof lines run in surveys meant that where the ends of the concessions are broken by a lake, that then the sidelines in that particular concession are to be run on the same course or parallel to the proof lines run in that concession; or if there were two proof lines, that the proof line nearest the end of the concession from which the lots are numbered should govern up to the next proof line, and that then the next proof line would govern up to the end of the township.

Mr. Van Nostrand—It is the order in which those lines come, as to when it is to be run at an angle on the front concession.

Mr. Kirkpatrick—As to whether you should take that extreme course of measuring the whole length of the concession and then running it on the angle given in the plan and field notes.

Mr. Van Nostrand—It seemed to me the statute is rather ambiguous as to which stage you enter the series of the different methods.

Mr. Kirkpatrick—In any case, I don't think the statutes will be all revised until after we meet again; and what I was going to suggest was that if any surveyor had any idea about any particular section or clause in the Survey Act that could be amended, if he would let me know, I would consult through the Law Clerk with the judges and see what their views are in the matter. I mentioned here to some of you, I think, about Mr. Fitzgerald's idea of putting the word "astronomic" before the word "course," and some of you said it wouldn't do for some reason. I don't know myself about that, because I have not done anything under the Registry Act in the way of practising, and I don't know how that would come out, but some of you are working every day in the cities, and you would be able to understand that.

Then I might make a verbal report at the Council meeting. We passed a by-law at the last Council meeting, authorizing Mr. Henry J. Browne to be placed on the list of those who are not required to pay their annual fees, the reason being that Mr. Browne, as you all know, has not been practising regularly for a great many years. He is a sufferer from neuralgia, and he has been unable to do much work for a number of years, but he would like to retain his connection with the Association, and also he has been, I think, over 35 years in the practise of the profession. Of course it is not the policy of this Association to place everyone, as soon as they have served 35 years, on the retired list, whether they wish it or not, because there are many men who have had 35 years and who are just as well able to practise and pay their fees as anybody else. I suppose I would be entitled to, but I should not think of asking to be put on the retired list. Some surveyors think the moment they become eligible by 35 years they may cease to pay any fees to the Association. The intention was when the Act was passed that anyone who had been practising for 35 years before 1892 could, on paying the registration fee of the Association, become exempt from paying fees; that was in view of their long service as Provincial Land Surveyors; but I don't think it was intended to apply to every surveyor who has come in since. In case the Association gets very much larger, Mr. Russell has a proposal that all surveyors should be pensioned, and he would like this Association to take up the consideration of pensioning him, because he has had over 35 years, but I think the Association's funds are not yet in that flourishing condition that we can do so.

The President—Has any gentleman any remarks to make with reference to these reports?

Mr. Green—What I am about to say should have been, perhaps, asked in the Question Drawer, but it would come under the head of legislation. First, What protection, if any, has a surveyor with his party in the field? This is the first year I have had anything to do with surveying in Ontario. I had a gang of men and some of them under written contract and others under verbal contract, and witnessed at all times, they were to remain with me until the completion of the contract; half of them stayed till about half the contract was completed, and then they left; they call it down here, I believe, "jumped the job." Now, I was aware the thing was about to happen from the rumors—there is generally someone in the camp who will tell you what is going on—and I knew they expected to "jump" on a certain Monday. The day before, Sunday, a brother surveyor came along and I consulted him about the matter, as to what was the best thing for me to do; how to protect my property from the gang, and to prevent them from taking anything that didn't belong to them. I took his advice in the matter, because I was personally interested and perhaps my judgment might have been biased. Anyway, he decided that the best thing to do was simply to forbid them touching anything, and then if they did take anything, I would have a criminal action against them. They left, as I stated, on a certain Monday, and left me in pretty bad shape. I had forbidden them touching anything, but they took whatever they wanted. When I came out I went to a lawyer and asked him to take criminal action, and he advised me not to, for the simple reason that the case will go before a jury, and it was not likely we would get a conviction. Then the question comes up, what is the surveyor to do? Is he to protect his property with a gun? He apparently has no legal redress. If he has no redress when simply under a verbal contract, what is the best written contract? I would like to see the Committee on Legislation draw up, or get the Council to draw up, a form of contract something similar to what we have in the Dominion Act. There a surveyor has some protection. Of course we all know the labor organizations are very strong, and particularly strong compared with the Surveyors' Association. I didn't pay these men; I told them I wouldn't pay them. They got out and they went to a lawyer, and the first thing he did was to write to the Department. Now, this is a very disagreeable thing for any member of this Association; it casts more or less of a reflection on him to have the Department write to him and tell him they have received certain complaints about his not paying his men. I would like to hear the views of the different members here, and to devise some means by which we may have protection. Of course during the summer weather the flies are perhaps the worst thing, but these men of mine all "jumped" just when winter was setting in, and it was almost impossible for me to get men again.

The President—I am afraid Mr. Green has opened up a wide question; when it comes to a question of contract and labor, it is one that comes under the ordinary laws. The question was quite fully discussed before, I think, in connection with a paper by Mr. Fitzgerald or someone. The question of contracts and as to whether there could be such a thing as a contract drawn up that would be binding, was discussed, and after looking at it from different points, I think it was concluded that it was not feasible. It is known pretty generally the position that the judges take in the courts with regard to laborers, in every case they decide the man must be paid, no matter what the conditions are.

Mr. Watson—I don't think there would be any remedy there.

Mr. Kirkpatrick—There has been a good deal of trouble of this kind in the last year with a great many survey parties, and while my sympathies are very strongly with the surveyors, I think they have probably the remedy in their own hands, and that is not to take out a gang of men that they know nothing at all about. If they can get the men that they can rely on and take out these men, the surveyors tell me they have no trouble. Others again pick up any man they can get, and they don't know whether he is accustomed to the woods or not. We have had several instances (and I don't know when the question is going to be settled, as it has gone on for two years now) in which the surveyor went up and just hired any men round about, and of course they wanted to go home and see their families every now and again! That was very nice for them, but what could the surveyor do? What he ought to have done was to have taken a gang of men up there from a distance, and he would have had them there and they couldn't go home because they had not the money. But if you go and put yourself in the hands of a lot of men living round where your work is, of course they want to go home occasionally. It is a very unfortunate thing for the Department, but how is the Department to adjudicate? It is not a thing they can adjudicate on at all: it will come to this, the surveyor will be sued, and I have not the slightest doubt, as you all know, that the judges will say, you pay the men; and the unfortunates will have to pay all these men perhaps a couple of thousand dollars—more than he gets for the whole survey—because the township has taken six or eight months to survey. But I think really the surveyors have it in their own hands, and they will have to look out and take men they are acquainted with. If they can get the same men over and over again it is all right; but in any case, take men you can be sure will be good men in the bush; there is no use picking up men from the cities, they are no good when they get out into the woods.

Mr. Green—I am glad to hear Mr. Kirkpatrick take up the question, but I am rather disappointed to think that it is going to drop. You know that the surveyors in the Northwest have a certain protection which the law gives them. Am I to understand we can't get any protection in Ontario against labor organizations? I move the Legislative Committee enquire into the matter and find out whether we can get anything?

The President—I don't think the Government would legislate in favor of any class of employers; that would be class legislation.

Mr. Green—No, it is simply between master and servant.

Mr. Bolton—The only thing is to make an agreement with an employee that you will give him, say, a dollar a day, and if he remains with you you will give him 50 cents a day in addition.

Mr. Green—The two previous speakers tell me that won't do any good.

Mr. Van Nostrand—Use a sliding scale of wages, a minimum wage if they don't stay through and a bonus if they do.

Mr. Green—I didn't pay my men and they helped themselves to canoes and provisions and tents and went.

Mr. Watson—You can get redress when they take your property.

Mr. Green—The lawyer I consulted advised me not to take any action against them, because he didn't think a jury would convict them.

Mr. Watson—I think your lawyer was wise. I believe the Dominion Department do issue a form of contract, but I understand that won't hold in Ontario. There is no use making an agreement with them at all.

Mr. Green—I presume that a contract holds because there is a certain law governing it.

Mr. Watson—In the Dominion I believe there is.

Mr. Green—Why can't we get a law in Ontario so that a similar contract will hold here?

Mr. Watson—That was suggested last year, but I don't think you can do anything; as the President says, it is class legislation.

Mr. Green—I understand that there was a law covering the point some years ago which has been repealed.

Mr. Watson—You would have to put it on a military basis before you could control your men. I had men one season, and one of them had been with me for about five years; they were Indians; I got one blackguard in the bunch—they all hang together—and he took the whole bunch out!

Mr. Fitzgerald—I agree with Mr. Green, it is a pretty hard thing to put up with, but I don't think there is any remedy.

Mr. Low—There was a case in Sudbury where the surveyor's men "jumped"; they left and took what they wanted, and they broke a canoe; the surveyor let them go ahead and sue for wages; the judge granted their wages, but made them pay for the canoe and anything else they took.

Mr. Green—I wouldn't call that very fair treatment myself. This particular case Mr. Low has quoted—I don't suppose there is any secret about it—everyone knows Mr. Bird very well; it was his gang; he was next above me, and I remember the party distinctly starting out, and it was the lawyer that handled his case that is handling my case now. Mr. Bird tells me that the judge allowed them for all the time they were there, and only deducted from their wages the taking of the boat and the destruction of the property.

Mr. Code—I have never had very much trouble with my men, and I am surprised that other surveyors should have so much trouble. It may be some advantage to know my system. I generally get a man in the locality, or as near the survey as I can, to look out some months ahead for a gang for me, and I pay the man for picking up the men and any trouble he goes to, and I simply tell him to make the agreement with the men that they are to stay the time required; and that time probaby will be three or four months, or whatever time the survey is expected to last. After you get the men, talk with each one of them personally; make a verbal agreement (a verbal agreement is better 100 times than a written agreement, because it covers everything), that the men are to stay, and if they are reasonable, come home with you when your contract is done. Of course some of those men are naturally "jumpers." No man can go into a new territory and pick out good men himself; he must have somebody who knows all these people, to employ men for him, and his services are well worth the small amount of money it costs. Of course those "jumpers" probably will never give you the reason why they "jump." I have only had about two men "jump" in my five or six years experience, and I guess they "jumped" by mutual consent between them and myself. I have had very little trouble so far with men.

Mr. Dunn—I am very sorry to hear that it is impossible to make or draw a contract so that men can be bound by it. I remember well the circumstance that Mr. Green has spoken of, and I thought at the time if Mr. Green would have to pay the large party that was going out, he certainly would find it a very considerable hardship to put up all of their wages and have to look for other men to take their places. I had only two men "jump" last summer, and I guess I am about to be sued for the pay of those two men, and from what I have heard now, I suppose I will have to pay it. I didn't think I would have to. I had written contracts with all of my men. I can't see how a verbal contract would be of any use, because I can't understand how you could prove the contract. You are one person and the men that you have with you are probably 16 or 18, and they would rather have the best of you if it came to a show down. I, of course, have not much experience in the line you speak of, but I mention these matters because Mr. Green mentioned my name, and I shall be interested in hearing the result of Mr. Green's trouble.

Mr. James—Do I understand that the sliding scale works well?

Mr. Low—We have found it works very well. We have had survey parties out, and the men "jump" and leave us with five or six days wet weather, and we cut out every hour we can, legally, and we give them the dirty end of the stick, so to speak. We find that works very satisfactorily. When they find we are going to give them as little as we can, they will stay on.

The President—My experience with regard to contracts supplied by the Dominion Government is this, I never saw a good man yet, or a man who I would want on a survey, who would sign one of those contracts. I have had a good deal of experience, especially in the Northwest; about 30 years ago, I think, I commenced to make surveys out there.

Mr. Dunn—I think when a man is hired by the month his pay becomes due at the end of the month. But could you hire a man for four months for, say, $200, and have an arrangement that the only way he could collect it would be by staying the four months? I understand you couldn't hire him to the end of the work, because he wouldn't know when the end of the work would be.

The President—I think you can hire him and not pay him till the end of the four months, but you will have to pay him for all the time he works, even if he leaves you.

Mr. Green—It is a legal question, but I move that the matter be referred to the Legislative Committee and let them get legal advice on the matter, and if a form of contract can be drawn which will be of any benefit to the surveyor or the members of this Association, let them formulate one.

Mr. Kirkpatrick—Wouldn't it be better, instead of referring it to the Legislative Committee, to refer it to the legal adviser of the Association, and get his views on it? That is, Mr. Armour, and if he can devise any means and give us a report on it I think the money would be well spent.

The President—Would you like to change your motion, Mr. Green, and submit this question to the legal adviser?

Mr. Green—Yes.

Mr. Code—I second the motion.

The President put the motion to a vote, and the same was carried.

Mr. Green—The other question is a question of bearings. In commenting on Mr. McMullen's paper, Mr. James spoke about his system of keeping traverse notes, or at least the bearings. I followed that system also for a great number of years, that is, doing away with bearings so far as north, south, east and west are concerned, and reading your instrument; where there is a double reading, just read the outside circle, which reads from 0° to 360°. You read the azimuth, as it were, and let the azimuth refer from 0° to 360° around by the right, like a watch, 90°, 180°, 360° from 0°. What I would like to know to begin with is, would the Department here accept returns with the azimuth, reading in that way round? I presume they would not. Every surveyor, I presume, who makes any extensive traverse, adopts that system. It eliminates a great many chances of error, because when you write north-east or south-west or any of these letters, you are liable to error. When you follow the system of the azimuth from 0° around to 270° and 360°, as contained in the B. L. S., you eliminate that error altogether, because everyone knows if you read your vernier 140°, where that is pointing towards there is no chance of error. It is just as clear to a surveyor, to my mind, as south 40° east, and as I say, it eliminates all chances of error in taking down the field notes. I presume that the Department here wouldn't accept returns that way.

I would move that steps be taken by which the Department be asked to accept returns given in that way, and that in the system of survey of Ontario some amendment should be made to that effect. I would like to hear someone else's views on this.

Mr. Bolton—I would hardly think that would be necessary. For my part, in making traverse I would use that, but it is an easy matter to change it to the bearings to suit the Department.

Mr. Green—It is easily done, but it is unnecessary.

Mr. Bolton—Well, it would be considerable trouble to the Department to change their method.

Mr. Kirkpatrick—We have never had them returned that way. The only real, practical difficulty that I see is that it would simply give Mr. Whitson and myself a good deal more trouble; we would have to do it ourselves. We couldn't hand over the examination to anybody else, while you all know we are pushed hard to do the work at all. We try to get the examination done as soon as possible. I don't know that we could teach men who are not surveyors that kind of thing. It is a very difficult thing to do to explain all the ins and outs of those things. I think it is quite easy for surveyors to do it. And then we have the old-fashioned custom. I could do it myself, but I haven't got time to examine every return. I do the best I can by looking over them after the errors are pointed out to me to see what they are.

The President—It is only a matter of a minute or two to show the bearing in the ordinary way to suit the Department. For my own part, I always adopt that means of reading my bearings around to 360° and also in plotting.

Mr. James—Wouldn't it be just as handy in our Registry Office to have it done by azimuth all through? The letters are of no significance to lawyers that I know of; they are just like Greek letters to them; they don't know exactly what they mean. If we had an understanding to make our returns to the Registry Office in this way it would be a start.

The President—In a paper two years ago, I think I tried to set forth the simplicity and advantage of making the traverse notes in this way, and it was discussed pretty fully.

5.15 p.m. the meeting adjourned to Thursday, February 27th, at 10 o'clock a.m.

MORNING SESSION, THURSDAY, FEBRUARY 27TH, 1908, 10.30 A.M.

The President called the meeting to order, and asked for the report of the Auditors as the first order of business.

The Secretary—I have already read my report and presented it to the Auditors. They have gone over the accounts and have certified as follows: "We hereby certify that we have examined the Secretary-Treasurer's vouchers, receipts, financial statement, and bank account, and find them correct. February 26th, 1908. Lewis Bolton, W. A. McLean, Auditors."

There being no discussion on the subject, the President declared the Auditors' report adopted.

The President called for the report of the Committee on Polar Research.

The Secretary—Mr. Chipman will put in a report for publication.

It was moved by Mr. Rorke, and seconded by Mr. Bolton, that the report be taken as read and printed in the Report.

The President declared the motion carried.

The President called for the report of the Committee on Entertainment.

The Secretary—I am sorry to say we were so late last evening I have not yet had time to prepare the report, but it seems from the accounts I have received, from most of the members present, that the entertainment was fairly satisfactory. I will write out the details, with the names of those present, so that it may be printed in our Report. I regret that we will not be able to include some of the able speeches that were delivered.

The President—The report will be taken as read and printed in the Report.

The President called for the report of the Committee on Engineering.

The Secretary—I understand Mr. Davis is not able to be here. I will write him to send his report for publication.

The President called for the report of the Council of Management.

The Secretary—I understand the report is not yet ready.

The President called for the report of the Committee on Publication.

The report was read by the Secretary.

It was moved by Mr. Rorke, seconded by Mr. MacKay, that the report be received and adopted.

The President declared the motion carried.

The President called on Mr. Selby to give his paper, entitled, "The Peace River District."

Mr. Selby—Mr. President, the object of this paper is not so much to extol the beauties and magnificence of that great country which we hear so much about in the papers, as it is to give you a more faithful description of it and a fair idea of what may be expected of it in the future.

The President—Papers like this of Mr. Selby's are of incalculable value to us, because they bring reliable information of parts of the country of which little is known. When we come to realize that this country which Mr. Selby has been telling us about lies eight hundred miles north of the latitude of Toronto, and about three thousand miles west, we can form some idea of the vast extent of our country. The paper is valuable because it is based on facts which we, as land surveyors, can depend upon, not on a cursory examination. For several years Mr. Selby has been making surveys in that country, and he knows what he is talking about. The paper is not only valuable to us, but valuable to the country at large and valuable to the Government and to all who desire information about our country. I am sure we all feel very grateful to Mr. Selby for the trouble he has taken in compiling this paper for our Report.

Mr. Kirkpatrick—I was very much interested in the splendid paper which we have just heard. I certainly think the thanks of this Association are due to Mr. Selby. Now, we can hardly realize the extent of the country that he has been describing to us. It seems to be immense. I have two sons in Edmonton, and it was only the other day I received a letter from one of them, describing a speech that was made at a dinner given by the Speaker of the Assembly to the Edmonton people. They were talking about buying seed wheat, and I think it was the Speaker himself said that one member of the Legislative Assembly had six thousand bushels of the finest wheat in the world, grown on his farm at Peace River, and that it would be for sale. They went on to explain the marvellous extent of the agricultural territory up there. He tells me that Edmonton has a population of nineteen thousand now, and when my son went there in 1889 there was a population of 650, so I suppose he is one of the oldest residents now. It was only yesterday I got quite a large photograph of the bank of which he is the manager, and I was surprised—there is scarcely a bank in Montreal or Toronto like it. There were four magnificent pillars of stone in front of a four-storey building, on a corner, and it looked very fine indeed. It is a perfect marvel. It shows what wonderful things are going on there under our eyes, and I am not surprised that young men say, well, we will go west. We all get the fever. I had not exactly the fever, but I went out there four or five years ago, and I drove out to Athabasca Landing, and I remember driving through a lot of poplar trees. The poplar trees were of the original forest, not the scrubby little things you see sometimes. I suppose they were between two and one-half and three feet thick, and just as good poplar as you would see anywhere. Of course it takes a long time to clear that ground, but there is the wood, and it shows what the country will produce. When you get to Athabasca Landing you think you are at the world's end, but they will have a Roman Catholic cathedral there which is to cost $100,000. I don't suppose it is finished yet, but the foundation walls were built, stone walls about ten or twelve feet thick. And, after all, that was only a jumping-off place, because you are four or five hundred miles from the Peace River, so there is no end to the possibilities there. We see a lot in articles about the last West, and I don't know that we should be so anxious to get rid of the last West. Some of us have got children and grandchildren, and we don't want to see it filled up this year or next year. My idea is we should go at it slowly and not introduce all the nations of the world up there, but try and make it a British Canadian country, so that the majority of the settlers will be of our own origin, so that we can make it a God-fearing country, and not introduce a whole lot of other people who will take a long time to assimilate. Of course they would ultimately assimilate, just as our friends the Doukhobors are doing. They are turning out first-class settlers because they are becoming Canadianized. I suppose you remember reading of the fifty or sixty of them who started to walk naked through the streets of Fort William when it was twenty degrees below zero, but they were promptly caged. They will eventually become good settlers, and we welcome them all!

I have much pleasure in moving a vote of thanks to Mr. Selby for his interesting paper.

Mr. Bolton—I have much pleasure in seconding the motion. Carried. (Applause).

The President—I have a communication from Haileybury, asking about surveys of lots. It is signed by James H. Smith, Robert Laird, and H. T. Routley.

That, I suppose, would be a question that would come before the Committee on Land Surveying.

It was moved by Mr. Bolton, seconded by T. D. Green, that the communication be laid before the Committee on Land Surveying.

The President put the motion, which on a vote being taken, was declared carried.

The President—There are several reports which the Committee on Publication will have to have authority to publish, as these reports have not been read before the Association. The first one is the report on Engineering, then the report on Polar Research, and the report of the Council of Management.

Mr. Hutcheon—I move that the report on Engineering, the report on Polar Research, and the report of the Council of Management be taken as read, and printed in the Report.

Mr. E. D. Bolton—I second the motion.

The President put the motion, which, on a vote having been taken, was declared carried.

The President—It is moved by Captain Gamble, seconded by Mr. Van Nostrand, that any errors or omissions in the record of the proceedings of this meeting now in the hands of the Secretary and the Reporter be corrected by the Committee on Publication before the printing of the annual report.

On a vote having been taken, the motion was declared carried.

Mr. Kirkpatrick—I would like to move that a resolution of condolence be sent to the relatives of our deceased brethren.

Two of these, you remember, were killed, if not three. Mr. Macdonald met his death by a runaway, and Mr. Davis stepped off a train and caught his foot; it had to be cut off, and he died from blood poisoning.

The President put the motion, which on a vote having been taken, was declared carried.

It was moved by Mr. Rorke, seconded by Mr. Newman, that the sum of $300 be handed to the Secretary for his services during the past year. Carried.

It was moved by Mr. P. S. Gibson, seconded by Mr. Van Nostrand, that the Committee on Legislation be requested to consider the contents of the paper by Mr. S. Bray, entitled, "City and Town Lots," before forwarding the suggested changes in the statutes to the Revising Committee of the Legislature.

Mr. Wilkie—I heard parts of Mr. Bray's paper read yesterday, and as a member of the Committee on Legislation it doesn't appear to me there is anything in that paper which would make it necessary for the committee to deal with it. The paper is in reference to sub-divisions of town lots, and apparently he wishes to have them made some particular size. It appears to me that is not a matter that this Association could request legislation upon. He also deals with the matter of high buildings on streets affecting the light. I don't see that we have anything at all to do with that. Of course I would like to study the paper closely, and possibly I might find something to be dealt with by the Committee on Legislation.

Mr. P. S. Gibson—He wishes the Legislature to authorize the municipal councils and officials to see that lots are laid out of sufficient depth, the same jurisdiction as they have with reference to the width of roads. There can be no harm in it anyway. As to the height of buildings, I suppose you are right.

Mr. Van Nostrand—The purpose of that motion was to draw the attention of the Legislative Committee to the contents of the paper, and let them deal with it. It seemed to me, in hearing the paper read, it was a step in the right direction. We have already found it in the public interest that the municipality should have the power to regulate the depth of the lots, because it is well known there are a great many eyesores in the towns and cities by reason of the insufficient depth of lots. The depth of these lots becomes fixed where they have streets upon each side, and they remain so for all time unless some very radical changes are made in the position of streets already existing. If the Committee on Legislation see fit to suggest to the Revising Committee of the House that this power be given to municipalities, that is to say, that the Registry Act be so amended that the Registrar will not receive a plan with lots less than the minimum depth, without the consent of the municipality, no particular harm could be done anyone, and much good might result to the public, and that good will extend away into the future long after we are gone.

Mr. MacKay—I heartily agree with what Mr. Van Nostrand has said. We know the Registry Act at the present time regulates the widths of the streets—at least, the municipality has control and can sanction the laying out of the streets at certain widths. Yet they have no control or power to regulate the depth of the lots. It often happens, I have found in my practice, that parties submit a plan of a sub-division where the lots are very narrow. Sometimes the municipality will not consent to the laying out of a narrow street, and simply cut down the depth of the lot and make the street 66 feet. In the case in question the municipality has no control over the sub-division whatever, whereas if both streets and lots were under the control of the municipality they could be dealt with.

The President put the motion, which, on a vote having been taken, was declared carried.

It was moved by Mr. A. T. Ward, seconded by J. J. Mackay, that the sum of five dollars be granted to each of the Auditors for their services in connection with auditing the accounts of the Association for the past year.

The President put the motion, which, on a vote having been taken, was declared carried.

The President called for nominations of officers for the ensuing year.

ELECTION OF OFFICERS.

Mr. P. S. Gibson—I nominate Mr. Van Nostrand for President.

The President—There being no other nominations, I declare Mr. Van Nostrand elected President for the coming year. (Applause).

Mr. Van Nostrand—I thank you for the honor. It is a responsibility that I rather shirk, but I feel at the same time it is the way out of trouble, because, having once put in twelve months in the position of President, one is given a long holiday, and that I can now look forward to.

The President—The next nomination is that of Vice-President.

Mr. Lewis Bolton was nominated as Vice-President.

The President—There being no other nominations, I declare Mr. Bolton elected Vice-President.

The President called for nominations for the office of Secretary-Treasurer.

Mr. Selby—I nominate Captain Killaly Gamble as Secretary-Treasurer. I am sure he has filled the position well in the past.

The President—There being no other nominations, I declare Captain Gamble elected Secretary-Treasurer.

Captain Killaly Gamble—I again have to thank you for the honor you have done me and the confidence you have reposed in me in appointing me Secretary for another year. I shall do all I can to further the interests of the Association. I feel my failures very often, and I know there are many others who could fill the office better than I can; but I always have the interests of the Association at heart, and will do the best I can. (Applause).

The President—I understand that the present Auditors do not wish to be re-appointed, so I must call for nominations for Auditors.

Mr. Rorke—I nominate Mr. J. J. MacKay and Mr. A. T. Ward as Auditors for the coming year.

Mr. Van Nostrand—I second the nomination.

The President—There being no other nominations, I declare Mr. MacKay and Mr. Ward elected Auditors.

Mr. MacKay—Mr. President, I am sure it is quite unexpected on the part of Mr. Ward and myself to be appointed to the position of Auditors. This is certainly a new duty for us, but we will do our best to see that Captain Gamble keeps his books straight.

Mr. Ward—Mr. MacKay has said all that was necessary on behalf of us both. I hope that the Secretary will keep his books in such shape that the present Auditors will not feel like retiring at the end of the season. (Laughter).

The President called for nominations for two members of the Council to fill the vacancies caused by the retirement of Mr. Kirkpatrick and Mr. Whitson.

Mr. P. S. Gibson—I nominate Mr. Kirkpatrick.

Mr. Kirkpatrick—I nominate Mr. Hutcheon.

Mr. Van Nostrand—I nominate Mr. Wilkie.

Mr. Ward—I nominate Mr. Selby.

Mr. Wilkie—I nominate Mr. Whitson.

Mr. Kirkpatrick—I nominate Mr. Fitzgerald.

Mr. Rorke—I nominate Mr. E. D. Bolton.

With the permission of Mr. Rorke, Mr. Bolton withdraws his name.

The President declared the nominations closed, and appointed Mr. Esten and Mr. W. McLean Scrutineers.

The President called for any unfinished business. (No unfinished business).

The President called for any new business. (No new business).

Mr. Kirkpatrick—I move that Mr. Fawcett leave the chair, and that Mr. P. S. Gibson take the chair.

Mr. P. S. Gibson takes the chair.

Mr. Kirkpatrick—Now I have the pleasant duty, but in one sense it is not a pleasant duty; but we know that things have to change, we have to appoint new Presidents; in the old days they said, "The King is dead, long live the King." So in the present instance, the President having vacated his office, it becomes us to give him a hearty vote of thanks for his great courtesy and the skill with which he has filled the office of President. It is a very great honor, I consider, to be the President of the Ontario Land Surveyors' Association. I know I felt it a great honor when I was President. I think we should stand up and give a vote of thanks to Mr. Fawcett for the way he has conducted the business in his year of office as President of the Association of Ontario Land Surveyors.

Mr. Wilkie—I have pleasure in seconding the motion.

Mr. Gibson put the motion, and the members standing up, gave a vote of thanks to Mr. Fawcett. (Applause).

Mr. Fawcett—Gentlemen, I appreciate very much your kindness, and thank you for your kind words. I have esteemed it a great honor to be the President of this Association, for I think our Association embodies some of the best and the ablest men in the Dominion, and to take charge of their proceedings or to hold a high office in such a body of men, I consider a privilege of which anyone might be proud. I thank you for the hearty way in which you responded to the motion.

All that remains now is to declare the meeting closed until next year. We hope all present will be permitted to come again together, with many who are not at this meeting. We know Mr. Van Nostrand, who has done so much for the Association in the past, will look well after it during this coming year.

PRESIDENT'S ADDRESS.

To the members of the Association of Ontario Land Surveyors:

Gentlemen,—I have great pleasure in bidding you welcome to this, the sixteenth Annual Meeting since the incorporation of our Society as the "Association of Ontario Land Surveyors." In reviewing the past year we have abundant reason for gratitude to the great Architect and Governor of the universe for continued peace and prosperity. The past year has been one of success and profit for the majority of the members of our Association, many of whom are unable, because of the urgency of their work, to attend the Annual Meeting even at this time of the year, when the demand for surveys and engineering work is not so great as during other parts of the year. For those who during the past season were engaged on Government, mineral and other surveys in the wilds of our own Province, the difficulties were by no means trivial, conditions arising which at times were very discouraging, excessive rains, dissatisfied and unreasonable employers, broken agreements, and desertions from the party, at times when great injury and loss would be the outcome, all have a tendency to place the surveyor on the anxious seat; but victory over such obstacles brings a feeling of satisfaction not otherwise experienced once the task is accomplished. We trust that the change in industrial conditions which has recently overtaken our country, in common with that of other nations, will not prove to be an unmitigated evil, but that those most affected will become more reasonable in their demands and take some little interest in the welfare of those they are employed to assist. Those who attended our last Annual Meeting, or who have read the Annual Report of that meeting, have knowledge of the several memorials submitted on that occasion: One to the Hon. the Minister of Lands, Forests and Mines, setting forth the necessity of increasing the remuneration for the work undertaken by the surveyor, both under contract, and salary, due to the increased cost of labor, supplies, and camp equipage. The majority, if not all of you, have learned that the memorial not only received consideration from the Department, but the recommendations set forth in the memorial were adopted with one single exception, thus proving the readiness of the Ministers of the Crown to remedy any defects in the Departmental economy brought to their attention. I am sure we do not fail as an Association deeply interested in this matter, to appreciate this immediate response to our request on the part of the Honorable Minister, and also the support of the Director of Surveys and the Deputy Minister, who are so closely in touch with the survey work that they could appreciate the justice of the request and bring the matter more fully before the Minister than we could set forth in a memorial. Another memorial to the Right Hon. Sir Wilfrid Laurier, Premier of Canada, set forth the urgent necessity of undertaking a geodetic and trigonometrical survey of the Dominion, and that the primary work should be undertaken by the Federal Government at an early date. The reply to the memorial in a letter from the Hon. Frank Oliver, Minister of the Interior, stated that the question had been carefully considered by a departmental conference convened at the instance of the Minister of Militia and Defence, and that the conference had submitted a report now before the Government. This reply bore date of 26th March, 1907. Preliminary work towards such an undertaking has been carried on to a limited extent by the astronomical branch of the Department of the Interior, we have been informed by our former President, Dr. Klotz; but much greater activity towards this important work will have to be displayed before any benefit be derived by the Provinces. If the work was fairly started and points in the primary triangulation permanently marked, I am confident that the progressive Provincial Governments would lose no time in carrying on the work to completion by arranging for the secondary triangulation, leveling and establishing permanent marks on the ground, and sectional maps on such a scale that they may be of utility to surveyors, engineers, municipalities, joint stock and insurance companies, and in all public works, supplying information which at present is only obtained through expensive preliminary and exploratory surveys which are indispensable in all road construction, railways and other roads, waterways and irrigation ditches, drainage, and all similar undertakings, before any estimate of the cost or idea of the best locations can be formed. Such maps as are constructed in connection with a completed geodetic survey would take the place of these preliminary and exploratory surveys, so that roads could be located, schemes for municipal drainage adopted, and a close estimate of the cost of all such undertakings arrived at, by competent persons, from the simple examination of the maps. A question of more than passing interest to our Association has arisen through recent legislation by the Dominion Parliament amending, or rather changing, the Act in regard to the qualification of Dominion Land Surveyor, the new Act providing that surveyors in certain of His Majesty's dominions, other than Canada, may become qualified as Dominion Land Surveyors without passing any examination except that portion of the Dominion Lands Act relating to the survey and division of lands, and the manual of survey issued by the Surveyor-General of the Dominion for the guidance of surveyors employed in the survey of Dominion Lands. When the Dominion Lands Act came into operation in 1872, all the surveyors who at that time were qualified to make surveys in any of the Provinces which constituted the Dominion at that date, were named *ex officio* Dominion Land Surveyors; all subsequent Dominion Land Surveyors became such by passing the prescribed examination for such qualification. Since that date the standard of the examinations has gradually been raised, both for Dominion and Provincial surveyors, in most of the Provinces, so that a standard fairly uniform in the ordinary mathematical subjects entering into the examination given by the several Provinces and the Dominion, has been adopted in so far as the examinations are similar. For a time there was reciprocity between the Dominion and Provincial Boards, so that examinations in those subjects which covered the same ground were accepted by the several boards of examiners; and those who had passed full examinations before the one board were not re-examined in the same subjects by the other. After a short trial, this arrangement came to an end, and surveyors from the Provinces were required to pass the full examination before the Dominion Board of Examiners to become qualified to survey Dominion lands, and those who had passed the Dominion Board had to pass the full examination before the Provincial Boards before they became qualified to make surveys in the Provinces. There was no particular hardship or grievance in this, as the candidates usually presented themselves for the two examinations while the subjects were still fresh in their minds; and the examining boards had the right to terminate the reciprocal arrangement if they considered the examinations were not similar in their requirements, and so long as all were admitted on the same terms. Truly there are several subjects relating to engineering and surveying prescribed in the Revised Statutes of Ontario, in which candidates for the Ontario examination are examined that are not included in the list of subjects for D. L. S.; and the several Acts are entirely different, thus necessitating separate examinations in these particular subjects; but the new Dominion Act, while it purports to re-establish the reciprocal status to a certain degree, states in a foot note that these advantages will only apply to sister colonies, such as Australia, New Zealand, Cape Colony, etc., ''where the standard of the examinations is very high.'' We do not believe that the standard of examinations for land surveyors is higher in any country than it is in the Provinces of Canada, and especially in the Province of Ontario, where three-fourths, at least, of the candidates who come before the board for examination are university graduates, and those who are not have to acquire an education in many respects equivalent to that obtained by the university graduates. It seems reversing the order of affairs when emigrants from foreign countries are granted privileges not accessible to the loyal citizens of Canada. That there was any necessity for such a change in the Act we do not believe. There certainly is no scarcity of surveyors, any more than a scarcity of doctors or lawyers, that they should have to be imported from foreign countries and constituted such by Act of Parliament. Few of us had heard anything about the change until it had passed through the Commons and became law. The Board of Examiners have some discretion in the matter, and as all the gentlemen on the present Dominion Board of Examiners are men who stand at the very top of the profession educationally, they will undoubtedly use that discretion in debarring any from qualifying who do not possess the mental equipment necessary for the work. I regret to have to report the death of six of our active members since last Annual Meeting, viz.: Messrs. Augustine McDonell, Chatham, Ont.; Milton C. Schofield, Guelph, Ont.; John McLatchie, of Nelson, B.C.; John Davis, of Alton, Ont.; R. H. Squire, of Brantford, Ont., and E. C. Steele, of Sault Ste. Marie, Ont. With five of the gentlemen I had little personal acquaintance, but with Mr. McLatchie I had a close personal acquaintance, as we often met in the Northwest in the early history of that country, and in Ottawa, where we both resided before he went to the western Province to make his home. I knew him to be one of the most careful, painstaking surveyors I ever met, a man who could carry in his memory landmarks and topography of places he had not seen for many years. He was one of those men who could endure all things, with an unlimited supply of energy and strength, and a constitution of iron; he could pass through hardships with an ease possessed by few men. All these gentlemen had served their country for a good many years, except Mr. Squire, who was one of the younger members of the profession. Mr. Schofield had been under commission upwards of sixty-four years. These departed remind us that we shall pass away sooner or later, and if we wish to merit the "well done" when we shall have planted our last landmark, we will guard well the principles lying at the base of our profession, "justice to all and favors to none," that we will each do our work "without favor, affection, or partiality," as required by our oath of office.

You will be pleased to learn that our finances are in a flourishing condition, and we have before us an interesting programme consisting of papers and reports from the various committees, which will provide abundant matter for discussion. The Chairman of the Committee on Polar Research, Mr. Chipman, assisted by the Council, has provided a treat for us this evening in Massey Hall, where we can become acquainted with the celebrated polar explorer, Commander Peary, and listen to the interesting narrative relating to his work in that great unknown region.

Reports.

SECRETARY-TREASURER'S REPORT.

Mr. Chairman,—I have the honor to submit my report of the official business of the Association transacted by me between the 26th February, 1907, and the 25th February, 1908. Early in the year, with the assistance of the Publication Committee, I revised the minutes of our Annual Meeting and prepared for publication the "papers" that had been read at that meeting.

We sent copies of our Reports to the following societies:

School of Practical Science, Engineering Society......	100 copies.
Michigan Engineering Society......................	130 copies.
Ohio Society of Surveyors and Civil Engineers........	100 copies.
Illinois Society of Engineers and Surveyors..........	150 copies.
Indiana Engineers' Society........................	130 copies.
Iowa Civil Engineers' and Surveyors' Society........	115 copies.

And copies of their Reports were sent to all our members who were not in arrears with the Association.

During the year 11 new members have been added to our list, three active members have withdrawn their names from the list of practitioners, and death has removed Messrs. E. C. Steele, John Davis, John McLatchie, R. H. Squire, Augustine McDonell, and also Milton C. Schofield, the oldest member of the profession, he having been admitted to practice 28th September, 1843.

There is much room for improvement in our Department of Repository and Biography.

Our thanks are due to the various departments through whom we have regularly received the Annual Reports of the United States Coast and Geodetic Survey, the Geological Survey of Canada, the Dominion Archives, and the Ontario reports of the Bureau of Mines, and the Bureaus of Industry and Forestry.

The financial statement accompanying this report shows the prosperous condition of the Association.

I must again, in conclusion, express my gratitude to the members of the Association for their support and for the assistance many of them have given me in carrying out my duties.

STATEMENT OF BALANCES, RECEIPTS AND EXPENDITURES BETWEEN THE 26th FEBRUARY, 1907, AND THE 25th FEBRUARY, 1908.

Dr.

To Balance in Savings Account 26th February, 1907...	$2,192 60
" Balance in Current Account 26th February, 1907...	213 65
" Receipts in Board of Examiners' account, including Government grant of $200 and regular fees....	952 00
" Annual fees, including Associate fees...........	979 09
" Amount collected from advertisements............	63 00
" Accrued interest in Savings Account.............	75 60
	$4,475 94

Cr.

By Amount for publishing Proceedings, 1907-8........	$ 427 75
" Amount granted to Secretary-Treasurer............	275 00
" Amount paid for postage..........................	97 20
" Amount, printing and stationery	26 85
" Stenographer's fees reporting the Annual Meeting..	50 00
" Amount granted to Auditors......................	10 00
" Freight, express, bank exchange, customs, brokerage and sundries	11 58
" Assurance on Secretary's Bond..................	7 50
" Armour and Mickle	6 91
" Caretaker of Repository	10 00
	$922 79
By Amount of disbursements in Board of Exam. Acct.	$ 336 70
" Balance in Savings Account......................	1,993 20
" Balance in Current Account......................	1,223 25
	$4,475 94

Respectfully submitted,

KILLALY GAMBLE,

Secretary-Treasurer.

REPORT OF THE COUNCIL OF MANAGEMENT FOR THE YEAR 1907.

The Council begs to report to the Association of Ontario Land Surveyors that it has held two meetings since the last meeting of the Association—one on the 16th April, 1907, and the other on February 25th, 1908.

At the meeting of the 16th April, 1907, Mr. George B. Kirkpatrick was appointed Chairman of Council for the ensuing year.

At the meeting of the 16th April, 1907, the several Standing and Special Committees required by the statute, by-laws and resolution of the Council, were appointed, also naming the Chairman of each Committee.

At the meeting of February 25th, 1908, the Council passed By-law No.   , to exempt from dues Harry John Browne, of Toronto. The by-law is as follows:

Whereas it has been proven to the satisfaction of the Council that Harry John Browne was granted a commission as a Provincial Land Surveyor on the 16th July, 1872, and that the said Harry John Browne has been for several years a great sufferer from illness and is practically unable to practice his profession, it is therefore enacted that the said Harry John Browne is hereby granted exemption from dues under the authority of sub-section 4 of section 42, chapter 180, Revised Statutes of Ontario, 1897.

During the year Azimuth Tables have been prepared by Mr. Frank L. Blake, as authorized by the Association, and have been distributed to the different members; also copies of the Ontario Land Surveyor's Minimum Tariff.

The Council has to regret the loss of six members of the Association by death since the last meeting, namely, Augustine McDonell, of Chatham; Milton C. Schofield, of Guelph; Edward Charles Steele, of Sault Ste. Marie; John Davis, of Alton; John McLatchie, of Nelson, B.C., and Richard Herbert Squire, of Brantford.

Respectfully submitted,

GEO. B. KIRKPATRICK,

Chairman of Council.

REPORT OF COMMITTEE ON PUBLICATION.

Mr. President,—We commenced business soon after the striking of the Committees by the Council at their April meeting. The publication of the Annual Report was entrusted to the Stevenson Printing Co., and was carried out promptly and satisfactorily, after the necessary material was placed in their hands.

The usual number of 1,350 copies was printed, at a cost of $427.75, and distributed amongst our exchanges and members.

A set of examination papers was printed in the Report.

We regret that our revenue from advertisements has fallen off latterly, and we would respectfully suggest that the Secretary be authorized to place this department in the hands of a professional agent.

Respectfully submitted,

KILLALY GAMBLE,
Chairman.

REPORT OF BOARD OF EXAMINERS OF ONTARIO LAND SURVEYORS, 1907-8.

The Board met in the Board Room. Department of Lands, Forests and Mines, on Monday, the 10th February, 1908.

The following candidates passed the required Preliminary Examination:—

Edward Fitzgerald,
George Leumas Flint,
Percival Anthony Jackson,
Lloyd de Loss Barber,
Kenneth Loudon Jardine.

The following candidates passed the required Final Examination:—

Arthur Gowan Ardagh, Barrie, Ont.
Gordon Foster Summers, Toronto, Ont.
Frederick William Paulin, Toronto, Ont.
Clayton Elgin Bush, Toronto, Ont.
Homer Wilson Sutcliffe, New Liskeard.
William James Moore, Pembroke.
John Leiper Lang, Sudbury.

Messrs. A. G. Ardagh and William J. Moore were duly sworn in on February 18th.

Messrs. Summers, Paulin, Bush, Sutcliffe and Lang to present themselves for the purpose of being sworn in at a later date.

The following articles were filed by the undernamed pupils during the year:—

PUPIL.	SURVEYOR.	RESIDENCE	DATE	TERM
Jones, G.S.	Moore, J. H.	Smith's Falls	1st. Feb., 1907.	1 year.
Ricketts, D.C.W.	Gillon, D. J.	Fort Frances	11th Feb., 1907	3 years.
Browne, W. H.	Browne, W. A.	Toronto	15th Feb., 1907	3 years.
Lee, M. R.	MacKay, J. J.	Hamilton	16th Feb., 1907	3 years.
Anderson, H.M.	Shaw, J.	North Bay	16th Mar., 1907	3 years.
Coltham, J. T.	Beatty, H. J.	Eganville	17th Mar., 1907	3 years.
Patterson, F. E.	DeMorest & Stull	Sturgeon Falls	25th Mar., 1907	1 year.
Moore, W. J.	Morris, J. L.	Pembroke	5th April, 1307	1 year.
Code, R. W.	Code, A. S.	Alvinston	1st May, 1907	3 years.
Paulin, F. W.	Wells, A. F.	Sandwich	1st May, 1907	1 year.
Lang, J. L.	DeMorest & Stull	Sudbury	1st May, 1907	1 year.
Sutcliffe, H. W.	Smith, J. H.	New Liskeard	10th May, 1907	1 year.
Summers, G. F.	Fullerton, C. H.	New Liskeard	10th May, 1907	1 year.
Bush, C. E.	Galbraith, W.	Bracebridge	11th May, 1907	1 year.
Stiles, J. A.	Moore, J. MacK.	London	8th July, 1907	1 year.
Chase, A. V.	Moore, J. H.	Smith's Falls	31st Aug., 1907	1 year.
Dempster, H. O.	Beatty, Walter	Delta	30th Sept., 1907	1 year.
McMeekin, A.	Seager, Edmund	Kenora	15th Oct., 1907	1 year.
Neelands, E. W.	Fitzgerald, J. W.	Peterboro	21st Dec., 1907	1 year.

The following bonds have been approved and filed with the Provincial Treasurer in accordance with the Revised Statutes of Ontario, 1897, chapter 180, section 36, sub-section 2:—

Arthur F. Wells, Toronto.
George Spencer Abrey, Toronto Junction.
Robert Samuel McCaw, Welland.
Samuel B. Code, Smith's Falls.
Edgar P. Bowman, West Montrose.
Thomas G. Code, Cobalt.
Richard S. Code, Cobalt.
Edward LeRoy Burgess, Ottawa.
William Hugh Holland, Toronto.
Herbert Thomas Routly, Haileybury.

Respectfully submitted,

GEO. B. KIRKPATRICK,
Chairman of Board.

REPORT OF COMMITTEE ON TOPOGRAPHICAL SURVEY.

Your Committee on Topographical Survey beg to report as follows:

It is with satisfaction that we note that the trigonometric survey of Canada, begun in the summer of 1905, has been prosecuted vigorously, and that substantial progress has been made during the past two seasons.

The stations of the chain of triangles extending down the Ottawa River from Ottawa to Montreal, the scaffolding for which had been constructed during the season of 1906, have been occupied, and a reconnaisance carried out from the latter point eastward along the international boundary. A reconnaissance has also been carried westward from Ottawa, and stations established for a chain of triangles covering a strip of country extending back from the St. Lawrence River a distance of about seventy miles. This has reached a point near Belleville.

An isolated piece of triangulation has also been laid out, consisting of six stations, two of which were stations of the U. S. Lake Survey, connecting points on the north shore of Lake Erie with points north of Lake Ontario. Most of these stations have been occupied during the past fall.

Lines of precise levels have also been carried inland along the lines of the railways in the eastern counties of Quebec. These when completed will serve as a control of the vertical components of the positions of points.

It is a matter for congratulation that our long-looked-for geodetic survey is at last in successful operation, and that the aim of those intrusted with its prosecution is to have it equal in precision to the best primary work. The delay in its inception is partly compensated for by the fact that we can profit by the experience gained by other nations carrying on such surveys.

All of which is respectfully submitted.

LOUIS B. STEWART,
Chairman.

REPORT OF COMMITTEE ON ENTERTAINMENT.

Mr. President,—Your Committee had the pleasure of arranging for our 23rd Annual Dinner at McConkey's Restaurant, Toronto, on 26th February, 1908, and the bountiful repast Mr. Mc-

Conkey provided for us more than fulfilled our expectations.

Our courteous President, Mr. Thomas Fawcett, filled the chair with his customary grace, and the vice-chair was ably occupied by our gallant and hearty Vice-President, Major A. J. Van Nostrand. It is to be regretted that neither the Minister of Lands, Forests and Mines, nor the Deputy Minister, were able to be present. We had many guests and a good attendance of members. The usual loyal, social and political toasts were warmly received and responded to, and we were much inspirited from time to time by the dulcet or lofty voices of gifted songsters. Finally the National Anthem brought us all to our feet to pray for blessing on our gracious King and to say good-bye until next year.

REPORT OF COMMITTEE ON LEGISLATION.

The Committee begs to report as follows:

Under date January 20th of this year, the Chairman wrote to each of the members of the Committee on Legislation, namely, W. R. Aylesworth, J. W. Fitzgerald, M. Gaviller, P. L. Gibson, C. A. Jones, A. Niven, James Robertson, T. B. Speight, and E. T. Wilkie, pointing out as the revision of statutes was going on at the present time and the judges are meeting to go over different statutes, that now was the time if anything was to be done with the Survey Act or any of the other kindred Acts with which surveyors have to do, requiring amendment or addition. I asked them to let me know as early as possible what their views were on any particular subject, and that I would try and see if they could not be embodied in the Revised Statutes.

Mr. Fitzgerald replied that he thought in the Registry Act the word "astronomic" should be put before the word "course" where it occurs that the astronomic courses should be mentioned on all plans prepared for registration.

Mr. Speight wrote that as regards section 26 of the Survey Act, the wording seemed to indicate that no proof line is to be recognized as a governing boundary unless the concession in which said proof line lies is abnormal, as described in sections 24 and 25. He states that it is a well-known practice among surveyors to use as governing lines side lines run in the original survey in concessions otherwise normal. That frequent differences of opinion have arisen as to whether the Act gives prior claim as a governing boundary to proof line as mentioned in section 26, or to the several other possible governing lines described in sections 24 and 25. and he suggests that this cause of difference might be removed by specifying the order in which the lines referred take precedence.

As there may be still time to have amendments inserted in the Survey Act or other kindred Acts, it is suggested that any member of the Association who has any amendment to propose would send it in as soon as possible to the Chairman of the Committee on Legislation, when it will receive the attention of the Committee.

Respectfully submitted,

GEO. B. KIRKPATRICK,

Chairman.

REPORT OF THE COMMITTEE ON EXPLORATION.

I regret that owing to the absence of the Chairman, Mr. T. B. Speight, and Mr. Niven, we have been unable to have a meeting of the Committee.

The usual exploration surveys have this past season been made by the Ontario Government in Northern Ontario. Mr. Niven was producing the boundary between the Districts of Thunder Bay and Algoma north to the Abitibi River from the Canadian Pacific Railway, which line, however, he did not finish and he is at present engaged in completing. Mr. Speight was outlining new townships west of the Missanabie River. These exploration surveys have opened up a new section of the province, heretofore unexplored, and they report large areas of good land and valuable timber. The exploration surveys being made by the Transcontinental Railway engineering parties is adding much new information as to the character of our north land, and it is encouraging to know that the more information we obtain of the character of our northern country, the more encouraging it is.

The exploration work of late has been very satisfactory, and the Committee are of the opinion that the work should be continued.

All of which is respectfully submitted.

H. W. SELBY, for Committee.

REPORT OF COMMITTEE ON REPOSITORY AND BIOGRAPHY.

Your Committee beg to report as follows: That we have at present forty large cabinet photographs of members of the profession, and that it will be necessary in the near future to get another album to preserve them, the present one being full. We have also twenty-three small photographs given by Mr. Unwin some years ago, for which an album has been procured.

We have at present biographies of Hon. Senator Casgrain, O.L.S.; Hon. Senator Vidal, O.L.S.; C. G. Hanning, O.L.S.; Hugh Black, P.L.S.; E. C. Steele, O.L.S.; A. R. Davis, O.L.S.; Charles Kennedy, Henry Smith, O.L.S.; Charles Unwin, O.L.S.; H. J. Browne, O.L.S.; Milton C. Schofield.

We think the time has arrived when some or all of these biographies should be printed in the Report. Some contain very interesting information about the life and work of the writers, and have been sent with the idea that they would be published at once, whereas it has been the practice in the past to publish them very much condensed as obituary notices. Some repairs and additions are needed to the furniture of the Board Room, also locks to the receptacles for the albums and papers of this Committee.

Your Committee would suggest that during the coming year a revised catalogue be made of the books, etc., in the Repository by the new Committee.

Respectfully submitted,

H. L. Esten,
Chairman.

REPORT OF COMMITTEE ON POLAR RESEARCH.

Mr. President,—In our Report of last year will be found a summary of the work done by the Committee since 1894.

So far as we can learn, Arctic Canada received but little attention from explorers during the years 1906 and 1907. The interior of Labrador, hitherto unmapped, has, however, been visited, and more than one private party has travelled through our Barren Lands, the objects of the parties being the study of the fauna and flora rather than the exploring and mapping of the waterways.

Capt. Bernier returned safely in 1907 from his cruise in the Government steamer "Arctic," but the official report has not yet been issued. He left Quebec on his last trip on July 28th, 1906, and returned on October 19th, 1907. The principal objects of the expedition were to license whalers and to collect customs dues from American fishing vessels. During his trip he visited the fol-

lowing places among others: Port Burmell, Black Lead, Kekerton (took soundings in Cumberland Gulf), Pond's Inlet, Albert Harbor, Port Leopold, Baffin Land, Bylot Island, Griffith's Island, Cornwallis Island, Bathurst Island, Byam Martin, Melville Island, Eglintin Island, Prince Patrick Island, Louther Island, Russell Island, Prince of Wales Island, Cobourg Island, North Lincoln Island, King Oscar's Land, North Kent Island, Graham's Land, Table Island, North Cornwall Island, Axel Heiberg, King Christian Land, and the Cone Islands. He also explored about 120 miles along the shore of Admiralty Inlet; he repaired Sir John Franklin's monument, and restored the headstones of the members of his expedition who died and were buried at Erebus Bay, on North Denon Island.

Fifty thousand dollars has been voted by Parliament towards another expedition, and Captain Bernier hopes to make a start about the middle of next June, and to get nearer the North Pole on this expedition than he has been able to do previously.

By sending out a properly equipped exploring expedition in alternate years for a decade, the Government would eventually acquire some conception of our long neglected heritage.

An expedition extending over the season of navigation only is but little more than a summer's holiday, but little can be accomplished of value to science or to geography without remaining in the field sixteen months or more.

Your Committee was fortunate in arranging for a lecture by Commander Peary at Massey Hall on the evening of Tuesday, February 25th, the first day of the Annual Meeting of the Association. The Toronto newspapers all reported eulogistically of the lecture and the lecturer, but if you searched them all for a glimmer of patriotic aspiration it would be in vain. The following report is from the "Globe" of the following morning:

"Though disappointed with the failure of his last voyage in search of the North Pole, when he reached the farthest north point yet touched by man, Commander Peary resolutely declared to a Massey Hall audience last night that he would try again, and he believed he would succeed. Peary is only a few months back from the latest effort in the quest which he has made the main objective of his life. Tall, weather-beaten, confident, and yet humble, as befits a man who battles with the unrelenting forces of the frozen north, he is as notable a figure on the rostrum as he is an effective commander in the wilderness. A straight story, narrated fluently without notes, his lecture is spoken from the heart, and reflects the mind of a man given much to solitude and the quiet confidence which such conditions bring.

"The splendid audience which greeted the lecturer's return to Toronto followed with the closest attention his story of the happenings from his departure from New York in the steamer Roosevelt on July 16, 1905, on through the ice pack, the winter at Cape Sheridan, the sled journey to north latitude 87 degrees six minutes, and the subsequent explorations on the northern coasts, until his vessel limped back to New York last fall. When he reached the point beyond which wisdom, scant supplies and hungry men decreed he could not go farther, he reluctantly turned his face to the south. 'My feelings at this time were the reverse of what you might suppose they would be,' he said. 'It is true we had beaten the record, but it fell so far short of the object upon which I had set my heart for fifteen years that my feelings were those of bitter disappointment.'

"Mr. Peary tried to picture what the North Pole would be like if it was ever reached by man. He naturally declared there would be no pole that one might run against in the dark; there would be nothing tangible, but there would be scientific conditions of note. For example, the wind, no matter from what direction it came, would be a south wind, and all the fixed stars would move across the horizon in a perfectly horizontal direction. In concluding, Mr. Peary defended the expenditure of treasure and effort in the search for the Pole, on the ground of the national and personal prestige it would bring to the successful explorers, and the satisfaction there would be in overcoming the greatest natural obstacles known to exist in the world. He declared his intention of leaving again for the north during the present year."

On his return to New York, Commander Peary wrote the Chairman of the Committee, expressing his thanks to the Association for the magnificent audience accorded him at Massey Hall.

If the lecture served in any degree to stimulate the younger members of the profession towards the possibility of attaining fame for themselves and honor to our country, the work of your Committee will not have been in vain.

We earnestly hope that some member may volunteer to attach himself in some capacity to Commander Peary's next expedition, and thus gain such experience in discipline that may hereafter be of material service.

Respectfully submitted.

WILLIS CHIPMAN,
Chairman.

REPORT OF COMMITTEE ON LAND SURVEYING.

Your Committee on Land Surveying for the year 1907-08 beg to report as follows:

The members engaged in survey work were so fully employed in the field that they have been unable perhaps to devote the amount of attention to purely Association work that its importance deserves. The members of this Committee are widely scattered, one being engaged in winter work in the wilds of Northern Ontario, and another making his way into the Peace River country. We fear also that apart from stress of work, apathy or comparative indifference on the part of a large number of members of this Association detracts largely from its influence and usefulness. With a general and individual interest proportionate to its importance, and the esprit de corps that should obtain among its members, the efficiency and value of the Association would be largely increased, and its standing before the general public materially advanced.

It appears to have been the practice in the past that committee work should be carried on by correspondence, and while this has the advantage of cheapness, this advantage is more or less questionable. More real work can be done in an hour's discussion in committee than in a year's correspondence. With this fact in view, it has been suggested that arrangements be made to have all committees meet and deliberate on the business in hand one day before the general meeting. In recommending this your Chairman would state that he acts solely on his own responsibility, and may or may not reflect the views of the other members of this Committee, but he is firmly convinced that such a measure, if it can be compassed, will add material strength and usefulness to the work of the Association. The same principle of deliberation might also be applied to the papers read before the annual meeting. These papers are largely technical and well thought out, and as their chief educative value accrues from free discussion and a comparison of the views of the several members on the various points brought forward, it seems to us that some plan should be brought forward to allow for more complete digestion before actual discussion takes place. The present rush methods neither allow due credit to be given to the writer of the paper, nor do they bring out its full value for the other members. Do we find this practice in parliamentary affairs, and are engineering and surveying problems entitled to less consideration?

One other matter that might be placed before you relates to the appointments of engineers to supervise the County Roads system inaugurated by the Government and aided by Government grants. As far as we can ascertain, these appointments appear to be made as a matter of expediency and ultra-local influence by members of the County Councils, and without consideration as to qualification or value to be obtained for the monetary expenditure. Men are largely appointed who are totally unqualified for the position; no plans, no intelligent examination of the ground is made to enable the supervisor to lay out the work in conformity with the monetary appropriation, and on account of the lack of data and intelligent operation no well regulated and continuous system is possible. If one engineer or supervisor be deposed and another be appointed, and the latter wishes to know the present condition of the roads, he must go over and estimate as best he may their requirements, not knowing what has been already done nor their previous condition. There are no plans from which he may draw this information. In view of the universal importance of good roads, on which subject it is not necessary to expatiate to the members of this Association, it would appear to be desirable to take some action in the form of a recommendation to the Government, whose approval is necessary, that such appointments be placed in competent hands, instead of continuing the present wasteful and unsystematic course.

We should like to point out to the members sending in questions to be answered in the Question Drawer, the desirability of making a specific question rather than a general one, in order that the point at issue may be clearly understood and a satisfactory reply formulated, even though in so doing a greater number of words be found necessary, for brevity and obscurity are close relatives, and lack of full data may bring an answer that falls quite wide of the point desired. In the present instance we have endeavored to answer all questions as fully as possible, considering the data furnished.

Respectfully submitted,

J. McC. Watson,
Chairman.

QUESTION DRAWER.

1. In the description in a deed the first part calls for a fractional part of the whole lot and is followed by a metes and bounds description of the parcel. It is found upon survey that the two statements in the description do not agree. Which governs?

Ans.—The statement in the first part of the description calling for the fractional part of the lot.

2. In a will the owner of a whole lot in a double front concession patented as East half and West half, leaves the East half to one person and the West half to another. On survey being made the East half as patented is found to contain three acres of land more than the West half. How should the division be made?

Ans.—If the will merely stated that the East half was to go to one heir and the West half of the lot to another, and contained no other statement to show that a different interpretation was intended, the expressions East half and West half would be construed to mean the East and West halves of the lot as patented.

3. If a surveyor is employed to divide a lot into four equal parts, and upon going on the ground finds that the boundary fences include more than the full lot, but have been in place more than thirty years, thus establishing possession, how would the division be made?

Ans.—There is not sufficient data given for a specific answer.

4. When a surveyor is required to describe the whole or part of a parcel of land of which the existing description is given him, should he designate the occupation he finds as being the same whole lots and parts of lots as stated in the old description, or should he determine with perhaps meagre data the probable location of lot lines and introduce or throw out hitherto unmentioned lots or parts of lots?

(b) Should the practice be the same whether the case concern farm or city lots?

(c) Should the practice be the same whether the adjoining owners are likely to litigate or not?

(d) How would the including of a part of an adjoining lot not before mentioned affect the title of these two adjoining properties? Would it act as a notice of undisturbed occupation and thus confirm the possession?

(e) What responsibility attaches to a surveyor's assumption of the coincidence of a fence with a lot line for purposes of describing and dividing off a new parcel?

Ans.—We do not understand why a survey would be made for description if the old description was to be adhered to. If it were a case where the lot lines could not be accurately determined but the boundaries of the property to which the owner held title were satisfactorily marked on the ground and established by possession or otherwise, the surveyor might plant permanent monuments at the several angles of the property and make these monuments the governing points in his description, thus making the lot line question a secondary matter.

(b) Ans.—The practice would be substantially the same whether farm or city lots were in question.

(c) Ans.—Regarding the possibility of litigation over the boundaries, the surveyor must use his judgment, taking into consideration the special circumstances of each individual case. In general, where it is not possible to locate the lines in such a manner that their correctness may be clearly proven, we would consider it better practice to endeavor to arrive at an agreement between the parties concerned, taking care that when such agreement is reached the division line is marked in a permanent manner and proper descriptions of the parcels embraced in whatever instruments may be necessary in the case, be recorded in the Registry Office to prevent as far as possible a recurrence of the dispute.

(d) Ans.—The mere filing of a description could not affect the title.

(e) Ans.—If a surveyor act upon the best evidence the nature of the case admits of, no liability could attach to his actions, and the only damage possible through errors of judgment would accrue to his reputation.

A communication has been received, signed by Messrs. Smith, Laird and Routly, of Haileybury, requesting an opinion of the Association on the question given below, and that such opinion should be brought to the notice of the Department of Lands, Forests and Mines. Cases are cited where patents or leases have been issued of parts of lots in surveyed townships and which upon survey were found not to cover the mining claim intended to be included by the applicant for such patent or lease, consequent trouble and complications resulting.

5. Should surveys of parts of lots in surveyed townships be obligatory before patent or lease is issued by the Crown?

Ans.—We would consider this distinctly a matter in the discretion of the said department.

Discussion.

Question 1. In a deed of land a certain part of a lot is said to be conveyed, but the metes and bounds description following is found not to agree with the first statement. Which governs?

Mr. Kirkpatrick—Does he say which part of the lot it is?

Mr. Watson—There is a certain part of the lot and that does not agree with the metes and bounds description..

Mr. Kirkpatrick—The designation governs. If the description differs it only helps to elucidate.

Mr. Watson—That is, if there is half of the lot conveyed, the half governs, notwithstanding the metes and bounds description. That is, if the description calls for the north half of the lot and the metes and bounds description does not tally with it, the north half of the lot governs.

Mr. Kirkpatrick—Certainly.

Question 2. In a will the owner of a certain lot patented as East half and West half, leaves the east half of the property to one person and the west half to another. Upon survey the east half is found to contain three acres more land than the west half. How is the land to be divided?

Mr. Watson—This, I think, is simply a matter of description; it is by the description; if it calls for the east half of the lot you would have to take the patent of the east half.

Mr. Kirkpatrick—That depends entirely on whether it is a double or single front. If it is a double front it is totally different. The easterly half cannot have a bit more in it than the west half, if you cut an orange in two, each half ought to be the same.

Mr. Watson—This is patented as the east and west half. I don't think there is much in that question; it is a legal matter, whether he means the east half according to acreage or according as it was patented. He owns the whole lot; it was patented as the east and west halves, double front concession; he leaves the east half to one person and the west half to another. There would simply be a question as to what he meant, whether he meant the east half according to patent or according to area.

Mr. Kirkpatrick—He couldn't mean the east half according to area of the whole lot because he is talking about the east and west half of which he has got patents, and he leaves one to one person and another to another person. It is perfectly clear.

Mr. Watson—It is perfectly clear to you because you are used to that sort of thing, but to a man who owned the whole lot, and was leaving parts of it to heirs, he might possibly mean an equal acreage.

Mr. Kirkpatrick—Then he would have to specify: "I am leaving him part of the east and part of the west half to make an equal division of the property."

Question 3. A surveyor is employed to divide a lot into four equal parts, and upon going on the ground finds that the boundary fences include more than the full lot, but have existed more than thirty years, thereby establishing possession. How is the division to be made?

Mr. Whitson—I suppose the fences would determine the boundaries of the lot.

Mr. Watson—If the fences overlap the boundaries what are you going to do?

Mr. Kirkpatrick—He might ask the man, "Do you want your property divided into four equal parts, or your lot?"

Mr. Wilkie—I would hardly think there is sufficient information to make the survey properly.

Mr. Watson—His instructions must be sufficient or else he has got to do the best he can.

Question 4 (first part). When a surveyor is required to describe a part or the whole of a parcel of land of which the existing description is given him, should he designate the occupation he finds as being the same whole lots and parts of lots as in the old description, or should he determine with perhaps meagre information the probable location of lot lines and introduce or throw out hitherto unmentioned lot lines or portions of lots?

Mr. Dunn—I should think he would follow the old description.

(Second part of Question 4). Should the practice be the same whether the adjoining owners are likely or not to litigate over the matter?

Mr. Watson—It doesn't make any difference whether he is up against a law suit or not.

Mr. Bolton—If you make the same description you are not liable. It is the easiest way out of the difficulty to avoid a lawsuit.

Mr. Watson—I think so, too. The best thing you can do is go on and establish the line as it stands there now, making a sub-division plan up against it and refer to that otherwise.

(Third part of Question 4). How would the including of a part of an adjoining lot not before mentioned in the description affect titles of the adjoining properties? Would it act as a notice of undisturbed possession and thus confirm the title?

Mr. Watson—That is supposing he went on, as I understand it, and made an even description, made his own lot lines, and they didn't tally out with what was occupied under the old description, he wants to know whether including part of another lot not before mentioned in the description would affect the title of the adjoining properties, or whether it would act as a notice of undisturbed possession?

Mr. Whitson—Did he send you a copy of the description?

Mr. Watson—It goes on: What responsibility attaches to a surveyor's assumption of the coincidence of a fence with a lot line for the purpose of describing and dividing off a new parcel? That is, if he goes on and finds the fence there and it is not the lot line, as he would place it, has he any responsibility? Could they send him down to the county jail or anything? That is, as I understand it, whether he ought to go on and make his own sub-division, or whether he should simply accept what has been taken as the line?

Mr. Bolton—It depends whether the fence has been up there eight or ten years.

Mr. Watson—I don't think so; it doesn't make any difference for the sub-division.

Mr. Bolton—I think he would require to notify all the other parties and have an understanding as to whether that was the line or not. You find these lot lines vary constantly.

Mr. Watson—A fence might have been put up and run from an original post forty or fifty years ago, but the people who could establish that point are gone. You can't get anybody else whose opinion would be taken as evidence there. It is better in that case if you can form a reasonable idea to take that.

Mr. Kirkpatrick—Wouldn't he divide it up and plant his post and point out to the man that his responsibility was then over? If he holds any other part of the lot by possession the mere planting of the post would not establish it.

Mr. Watson—The trouble is the Act requires you to establish your points by originals. Where surveys have been made 80 or 90 years ago you can't get men who can establish those points.

Mr. Kirkpatrick—But you can establish how long the fence has been there.

Mr. Watson—Oh, yes; but the average judge would not take that.

Mr. Kirkpatrick—If I exhausted every source of information and found there was no person who could give me primary or secondary evidence as to the post, I would simply divide up and tell the man: "That is the true boundary of your lot; I have nothing to say as to your possession of another man's lot. If you have that by possession, of course the law will give it to you, but I have tried all I can do to find evidence of an original post; you can't show it to me; none of the adjoining owners can show it to me; I can hear of no person that can; you can't say that you ever heard that that original fence was put up from the original post or that anybody ever heard of that post." If you do all that, I don't know what else you can do but divide up.

Mr. Watson—You can't do anything, because no matter how you describe it, the man has got an idea that a surveyor should come along and be able to positively establish the line.

Mr. Kirkpatrick—I know that, but that is not his responsibility.

Mr. Watson—Yes, but he does not think that, and very few of the judges do. I know of a case in our county where a surveyor ran a line, and he had run a compass line some years ago in the concession across the road, a double front concession; as the people didn't want to pay anything for it, it was merely a rough line. There were some people on the other side of the road cutting timber, they went to work and picked that compass line up and produced it through, and the person on the other side thought they were trespassing, and he called on the same surveyor again. He took an observation and ran a transit line through. The case came up in court and the judge established the compass line produced on the other concession on a different bearing altogether, simply because he couldn't establish the original point. It was reversed on appeal, but that is not a very nice thing to be up against all the same.

A Member—Has a surveyor any right to run a rough line like that?

Mr. Watson—Certainly he has, if he is given full latitude. He is not inside of the law at all. I don't think in every survey a person takes up, that he is bound to comply exactly with the Act that it should be done with a legal line. The judge established this line from men who were not competent at all taking the old compass line and producing it across into the other concession.

Mr. Bolton—That is merely across the road.

Mr. Watson—Yes, but the judge had no business to establish it.

Mr. Kirkpatrick—You say it was reversed on appeal?

Mr. Watson—Yes.

Mr. Kirkpatrick—If he had taken an astronomical course and it was run from the original post, it wouldn't govern.

Mr. Watson—The judge should know, and if he doesn't know, he is not competent to fill his position.

Mr. Kirkpatrick—I think if the surveyor was produced he should make the man examining him point out that particular thing.

Mr. Watson—I don't know whether he did or not, but I think the judge should know.

Mr. Kirkpatrick—I don't know; the judge never knows anything except what the lawyers bring before him.

Mr. Watson—Well, then he doesn't know very much. He ought to know what he is basing his decision upon.

Mr. Kirkpatrick—He ought to know.

Mr. Wilkie—The judge decides the case on the evidence before him.

Mr. Watson—I don't think he does. He couldn't do it in that case; all he has to do is look up that section of the Act.

Mr. Wilkie—In this particular case you speak of, where the compass line was established, the judge did so on the evidence before him.

Mr. Watson—I think the judge should know; he should not be humbugged by lawyers.

Mr. Wilkie—They take what is put before them; they don't take the trouble to ascertain whether these things are in accordance with some certain statute or something else.

Question 5, Sub-section 2 of Section 28 of the Survey Act requires the side lines in certain townships to be run on the astronomical bearings stated in the original field notes, but excepts such blocks in the said townships where any line was run prior to July 1st, 1897. If a line be found on the ground, how is a surveyor to determine whether or not it was run previous to the above date?

Mr. Kirkpatrick—We had that question up in the examinations and there was a very curious interpretation put upon it by one of the students. I had to ask him how he read that. He thought in every case in which there was one line run in any section he was to adopt the astronomical course of the township, whereas the Act says the exact reverse. Any section in which any single line was run in that section before the 1st July, 1897, all lines in that section or block must be run in accordance with the course of the side line that was run.

Mr. Watson—That is the way in which I understand it, although it is not very clear.

Mr. Bolton—That means the line was run in the original survey of the township?

Mr. Watson—No.

Mr. Kirkpatrick—Any private survey in which a line is being run in any block is not to be governed by the astronomical course on the plan and field notes, but by the course of the line on the ground. If it is the line between 6 and 7 it has to be governed by the sideroad between 5 and 6 all the way through the section; you are not to stop because one was run in the first concession and there was no line run in the second concession. It says the block. You must recollect that every one of those nine other lots in that section are governed by the same governing line that that one line was governed by.

Mr. Watson—That is all right on paper, but if a line be found on the ground, how is a surveyor to determine whether or not it was run previous to the above date? (July 1st, 1897).

Mr. Kirkpatrick—That he has got to find out by enquiry.

Mr. Watson—There may not be anybody there.

Mr. Kirkpatrick—He must find somebody. I admit it is a pretty hard thing to do.

Mr. Watson—He may find somebody out of self-interest to say it was run before 1897.

Mr. Kirkpatrick—Cut out a block of timber and count the rings and he may find there were certain rings which proved it had been run before 1897—.

Mr. Watson—You might get that on ten years blazes, but on blazes made within three or four years it would be a pretty hard thing to do.

Mr. Bowman—Supposing the line that had been run had gone round one of these old mining locations?

Mr. Kirkpatrick—A mining location was not a block.

Mr. Bowman—Supposing the line that had been run had been broken by a mining location?

Mr. Kirkpatrick—But we have always carefully told the surveyors to run the line through the mining location, but not to blaze it.

Mr. Bowman—That is what I should have done, but I thought I might as well raise that point.

Mr. Watson—The question (5) goes on: "Is the expression 'any line' in the above sub-section intended to apply only to lines run in the proper legal manner prior to July, 1897, or would apply to, say, a rough compass line run through the block without proper precautions having been taken in its location? Now there are a lot of lines through that country that have been run by lumbermen. What are you to do?

Mr. Kirkpatrick—No person is entitled to run a line except a licensed surveyor.

Mr. Watson—The question (5) continues: "If it apply only to lines run according to the proper legal practise prior to July, 1897, how is a surveyor to determine whether or not the line was properly run?" How are you going to investigate those points? Supposing I come along to a block like that and I find a line there and there is nobody living there; that line might have been run by a surveyor or a lumberman; a surveyor might have run a compass line; he might never have got the proper sub-division, or he might have chained it down the distance shown in the field notes. They run up a compass line, and the lumberman, or whoever it is, won't pay for it; how do you know whether that line was run properly or not? Must you go to work and go up the side-line and make up your sub-division to see whether it tallied before the Act of 1897 or not?

Mr. Kirkpatrick—I don't think I would care whether it was run right or wrong. If it was run by a surveyor, I could tell pretty well by the way he blazed the trees. I lumberman never blazes a line properly. If it was blazed and I found it run 15 years ago, I wouldn't bother my head whether it was run right or wrong; I would run my lines in that section right. I would let the compass line stand for what it was worth.

Mr. Whitson—Why should you enquire particularly whether the line is run properly or not?

Mr. Watson—That is what I want to find out. Supposing it came up in a lawsuit and the surveyor hadn't enquired or found out or couldn't give evidence as to whether that line was properly run or not, would that throw him out of court?

Mr. Whitson—I think it would be wise for him to run that line to the proper bearing.

Mr. Watson—It might be a surveyor's line or a lumberman's line. How are you going to find out these things?

Mr. Whitson—How are you going to find out whether any line is the original line or not? You are in no worse position.

Mr. Watson—I think you are in this case, because in the original line you can get at the date. There are no local surveys made for a great many years afterwards, as a rule, in the vast majority of townships; but in this it says "any line" or "any block." A lumberman's line would be a line, or a surveyor who ran up there without defining the property, that would be a line I suppose. It depends what that means. I would call it a line if a man cut a line through a bush and blazed it.

Mr. Code—I wouldn't, because it wasn't done under authority.

Mr. Whitson—All lines referred to in the Act refer to lines established by a surveyor.

Mr. Watson—Supposing a surveyor didn't make a proper subdivision, and he simply ran a compass line through there?

Mr. James—A surveyor running a rough line should not blaze it.

Mr. Watson—It would be no use if he didn't blaze it. The man cutting timber wants it blazed or he does not know where he is.

Mr. Code—In that case I would say it was only a line when it was run by a surveyor.

Mr. Watson—He might run a rough compass line. He may not at the time have intended it for a true line, but it is very hard for the surveyor who comes on ten or twelve years after to find out his intention.

Mr. Code—He couldn't, particularly if the surveyor was dead. I think the statute is not explicit enough.

The President—Would you mind reading that second question again?

Mr. Watson reads Question No. 2.

Mr. Whitson—I think Mr. Kirkpatrick answered that question.

Mr. Watson—It is simply a question of description. If he says the east half of the lot, you have got to go by the patent; if he says the east half of the property, you might consider the acreage. The east half is the patented half, and it does not make any difference about the west half.

Mr. Green—Then I would understand that the lot is to be divided as it is patented? Of course Mr. Watson may know the circumstances of the case, but they are not stated in the question.

Mr. Van Nostrand—The question is incomplete. That is surely clear to anyone who understands the Survey Act. If it is a double front, it is quite possible to have different areas; if it is a single front, you can't have different areas any more than you can have more than two different halves.

Mr. Watson—It is simply a question of good or bad description in the will.

The President—The distinction is between half of the lot and half of the property. The property would mean the area; the lot would mean the lot as it is described in the description, which would be half of the lot without taking any account of the area at all.

Mr. Green—Would it not do to subdivide that lot as it is patented?

The President—Yes.

Mr. Green—Wouldn't that be the answer to the question?

Mr. Van Nostrand—Certainly.

The President—We all might differ on that last question. I know, for my part, it would be necessary that there should be evidence to prove that the surveyor had run a line in blocks; and whether the line be run correctly or incorrectly, if it were run by a surveyor, as long as the evidence was satisfactory that the line had been run, I think I would accept that; and I would run the lines in the direction of the governing line. I think I would take the responsibility of doing that rather than run on the astronomical course in the field notes, although the line might be run wrongly.

REPORT OF COMMITTEE ON DRAINAGE.

Mr. President,—Your Committee on Drainage, while able to report an excellent year in the matter of surveys for drainage work, is unable to throw much light on the matter of litigation.

The situation, owing to the reports of decisions, is becoming somewhat clearer to members of the profession having practice in this line, but litigation is perhaps more than ever regarded as a prolific source of income.

I have to embody in this report the opinion of one member who states that "The Ditches and Watercourses Act never was and never will be a useful and workable Act until a Referee is appointed to try appeals in place of County Judges, and this Referee should be an O. L. S. of at least ten years' standing and should have to assist him two non-residents, and the decision of this board should be final."

From time to time defects have been pointed out regarding the Ditches and Watercourses Act, and in some counties decisions have been rendered that are apparently at variance with decisions on similar cases in nearby counties. . The method of procedure in removing the adjustment of differences from the field of the engineer to the judgment of the County Judge, who must rely on the evidence and is often handicapped by lack of engineering knowledge, seems at times a step in the wrong direction, but engineers must work under conditions as they find them, and there is still a strong demand for the engineer who can compile a report that will stand the cross-examination of the lawyer for the appellant.

It is to be hoped that procedure will be simplified in some way to carry out the original intention of the Act without the large expenditures now in evidence, but the parties who are to do the simplifying will have to "take on" the best bunch of fighters the country possesses.

The inspection of ditches at the time of completion under the Ditches and Watercourses Act seems to be a proceeding that although it is clear enough in the Act, is but little required, and in few cases does the engineer inspect.

The ease with which work under the Drainage Act is initiated is refreshing, coming after the severe restriction of larger schemes by the often-mentioned case, Sutherland Innis v. Romney. It is still apparent that in case of an injuring liability assessment. that specific examination of each lot and parcel of lot is required to ascertain the amount of artificial work. The division of outlet liability and injuring liability remains difficult and is sometimes extremely hard to define.

The fact that certain County Judges refuse to recognize as Township Engineers men who have no professional standing or who are not Ontario Land Surveyors is commendable. There seems to be an increasing number of men who are acting as Township Engineers without any such standing, and this should be discouraged.

Government aid in certain cases is an important element in initiating drainage schemes, and your Committee commends this as an easement to sometimes severely taxed areas.

Topographical surveys in drainage suits are viewed with favor in the Courts, and where the work is done with the transit level, stadia and magnetic needle, the cost of performing such is small compared with the benefit to be conferred by plans of this kind as evidence.

Owing to the increasing scarcity of timber there is increased demand for concrete culverts to take the place of wooden structures, and the adoption of a simple and yet artistic type of concrete or reinforced concrete bridge is being advanced.

The necessity for making the affidavit to be taken by the engineer under the Drainage Act *before* undertaking the survey is apparent from some recent decisions of the Drainage Referee.

All of which is respectfully submitted,

A. S. CODE,
Chairman.

PAPERS.

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SOME THOUGHTS AS TO THE ORIGIN OF EARTHQUAKES.

BY FREDERICK W. WILKINS, O.L.S., NORWOOD, ONT.

The subject of the following paper, which I shall entitle "Some Thoughts as to the Origin of Earthquakes," was suggested to me by having seen, just prior to the San Francisco catastrophe, a statement somewhere that a very celebrated scientist had investigated the form of the earth mathematically, having regard to the known speed of rotation on its axis, its density, etc., and all other things then known (150 years ago) about it in a physical sense, or surmised about it, and had come to a surprisingly close, comparatively, by this abstract method, of the just-about-at-that-time-ascertained elements of the earth's form, and showing thereby that the difference (1-300 or thereabout) found by geodetical methods between the earth's polar and equatorial diameters was and must be correct. This struck me at the time as a little singular, seeing that at that time (150 years ago) it was universally supposed that the earth we know and walk upon was but a crust or shell-covering of no great thickness, of a liquid or semi-liquid mass forming the interior, and that this known part but the cooled outside of a mass that at one time was all liquid. Obviously this state of liquidness or rigidity, in its degree as such, must have been an important factor in determining its form and the time of it as to its synchronism with a certain rate of rotation must of surety have had a very great deal to do with its determinations—that is, as to whether it was very liquid or very rigid at the assumed rate of rotation. If we should assume that at or near the beginning, when gravity and substances were first instituted, that a certain quantity of matter found itself in a certain position in space, having all its particles exactly alike in all senses, and having no cohesion among its particles, being held in position by gravity only, and having no axial or any other motion, it would seem from all we now know of the law of gravitation that these said particles would arrange themselves into the form of an exact sphere.

Suppose that it be now endowed with a very slow rate of axial motion; in an instant it would assume another form, that of an oblate spheroid, the lesser axis being that of rotation. This change of form, as I have said, would apparently take place instantaneously; but suppose a certain degree of cohesion to exist among these said particles, then time would now enter as a factor among the other conditions, and according as the cohesion was more or less and the speed of rotation more or less, would more or less time be expended before a stable condition be come to and fixed form be arrived at. Now, fixed form is the keynote of my earthquake ideas. But if the earth ever was in a gaseous or fluid-divided condition, as has been supposed by some, then something such as I have outlined above—a quantity of matter in space—must have actually conditioned, and coming on from the condition, must have developed into what we know as the earth, the world, wherein, or on, we live. Let us assume this, and let us further come down to about the present epoch of time, for discussion's sake and for the sake of comparing notes with the aforementioned mathematical demonstration or deduction. First item, there are certain matters of condition about the earth's motions which point strongly to the conclusion that the earth has not always rotated on its axis at its present rate. The fact is certain that its speed has varied, and there seems no reason to doubt that at one time, at least, its speed was much greater than at the present time. Let us assume this also, and let us again further assume that this was a condition through a vast period of time, beginning in the embryo or early stages of the earth's growth, and that during it the matter forming the earth changed from a non-coherent mass of particles (at least, for a long way in from the outside) to a well-adhering solid core or mass of rocks and metallic substances, the existence of which is now a certainty.

Now, from our first premises, that a globular form (oblate spheroid) of large eccentricity would result, and if the very high rate of rotation be maintained for a very long period, so that a great degree of cohesion obtained for a very considerable distance in from the outside (an assumed condition at the present time), it is plain that we would now have a very decidedly fixed shape to the earth's body—one not easily changed, and certainly not instantaneously so. That the rigidity of the earth is very great admits of certain mathematical demonstration, for taking the tremendous daily impact of the tides on the masses of land, it can be shown that so far, at least, as the eastern side of this continent is concerned, it must be at least as rigid as a solid armor-plate of the best steel twenty-five miles in thickness is. Now, so far as we know of the rocks which form the rigid part of the earth's body, nothing at all comparable with this is found. The rocks on the outside (baked by the sun) are much firmer than those below them, and thus it would not be at all fair to take them at their outside strength, but much below this, for comparison. There are also a number of other things beside this that make it almost conclusive that the earth is solid to the centre. This is the prevailing view nowaday, anyway, and it seems like common sense to assume that the centre of the earth (or near it) should get solid first. The motion of rotation at or near the earth's centre is little or nothing, while at its surface it is very considerable; thus one would suppose it would be much more liable to consolidate at that part, and that thus the earth solidified or gathered cohesivity together from the centre outwards, and is thus entirely solid, rather than from the outside inwards, as the crust idea conveys. Further, this idea would seem to combat the notion of intense internal heat for the earth—and this notion of intense internal heat seems inexplicable to me on other grounds, and plainly thus would greatly affect certain views as to the cause of volcanoes.

But to pass on. Suppose, now, that the earth reached a solid condition while still rotating at a much greater rate of speed than at present; then upon a slowing down (gradual, or otherwise) of its actual motion (and I firmly believe this to have taken place, and is perhaps imperceptibly doing so still), we would have a well-maintained rigid form (especially if the slowing down was gradual) not in conformity with the shape it should take as a result of this slowing down. The extra mass at the equator (13 miles thick at the present) would exert more and more pressure on the underlying mass of rocks, etc., and gradually cause these solid constituents of the earth's body to flow towards the poles, and this I believe is actually and actively going on at the present moment. Of course this extension of the earth towards the poles is extremely slow of necessity, and more and more so as it approaches its true shape as time goes on. Hundreds of years must elapse before geodetical methods would detect any difference, for it is not probable that we know even now the exact diameter of the earth at any point much nearer than two hundred feet. Now, let us suppose this rate of extension to be only one inch yearly—perhaps it is not even so much as this; but take it at that, and for the sake of discussion, so as to easily take in what the effect would be, let us imagine the earth divided in half at the equator and each half drawn in the direction of its poles until one inch intervenes; this space, then, a cylinder 8,000 miles across and one inch long, would thus represent the volume of change in form by the above polar elongation, and would equal about 800 cubic miles in content—that is equal to a cube greater than nine miles on each side. No small hole would this be, either, if applied in one place; however, it would be more or less distributed, the sinking-in thus occasioned being much more pronounced towards the equator, and nothing at all at about half way to the poles.

Now, the outer beds of rock forming the outside part of the solid earth are much firmer and stronger than the inside, being sun-baked, and in such a subsidence as supposed there can be no doubt but that the softer rocks of the interior would draw away from the upper and harder rocks, and would thus form a cavern, or more likely, caverns, under which by their subsidence, more or less sudden, a thing certain to happen, cause all the varied forms of seismic disturbances. If one cavern were thus formed in a year it would be approximately, say, 1,000 miles square and seven feet high at the centre. Suppose five caverns were thus formed—one for each of the great ocean basins—then if each of them be 1,000 miles square, the height would be, say, seventeen inches; as each of these vast caves (or their equivalents) would develop, they would, of course, fill in with water, petroleum, gas, etc., etc. Suppose, now, that the rocks forming the under part of the roof of one of these caverns has reached its limit of endurance as the gradually widening cavern is thus formed, and suddenly comes down, great rushes of the gaseous or liquid substances that had infiltrated here will now take place, causing the rushing, rumbling noises in the earth often heard at the times of earthquakes. This subsides and all is quiet for a time, when all at once the rest of the roof gives way, and premising the rocks forming this part of the roof are hard and firm (very likely to be so), a fissure or fault takes place in them, reaching, perhaps, for hundreds of miles across the country. Down drops one edge of the fissured rocks the 17 inches mentioned so suddenly, that a tremendous wave is directely propagated in the inclosed liquid filling, causing the overlying strata on the surface of the ground to rise like a wave on the ocean, and as it passes along, to fall into the trough behind it, and thus to oscillate to and fro for some time; or it may be that the falling edge of rock may catch part of the way down and again slip, or may do so several times, thus causing many rockings of the ground or "quakes" before subsiding, when the disturbances cease for that time. Suppose, again, that one of the caverns maintains itself for a number of years through having a strong, rocky roof; then when it does come down, terrific are the results, and the heat thus produced by the friction of the rubbing rocks so great as to melt the rocks and thus cause the volcanic eruptions.

But I have said enough for the present. How easy to imagine how and to account for tidal waves and kindred phenomena occurring in the oceans, the countless fractures in the rocks and their filling in with vein matter, the metamorphic condition of stratified rocks, etc., etc. By far the greater number of dreadful seismic catastrophes have occurred near the sea coast, and this easily comes in line with those ideas, for as is well known from pendulum observations, the rocky strata under the sea are much less dense, and others probably much less rigid, than those composing the dry land; and this, connected with the daily on and off pressure, tremendous in potentiality, of the tides, seems to offer a very strong presumption that this is the true origin of earthquakes. Many more interesting deductions are admissible in this connection, but perhaps this is enough, or more than enough I hear some one say.

DISCUSSION.

Mr. P. S. Gibson—I suppose, with regard to the San Francisco earthquake, it might be in place to remark that a great many people consider it from a theological standpoint. It was supposed that San Francisco was a very wicked city, and was visited with the earthquake as a judgment. I am not surprised with the views expressed with regard to this, because we have an astronomer who says that our earth, instead of going around the sun, as we generally suppose, floats a certain distance away from the sun and revolves but never gets round the sun; but as I said before, I would rather be inclined to take the San Francisco earthquake up as a theological question. It is an easy way of getting out of it. (Laughter).

I heard a theory of this kind one time; it was promulgated by a gentleman who thought the earth was made in such a way that the water cannot escape, because if it goes down it is heated and comes up in steam, and if it goes up it is frozen and comes down in hail.

Mr. Sewell—The generally accepted theory is, it was more or less a matter of steam. We know well enough that our volcanoes are often situated near the seashore, where they can imbibe moisture through the fissures of the earth, and in that case the water percolates through the fissures into the heated mass down below and forms steam, and by and by it brings about an explosion. Now it is generally known that before volcanic eruptions earthquakes frequently take place. That is one class. But then there are a number of others, like the San Francisco earthquake, which cannot be accounted for in that way. Those must necessarily be from the faulting of the rock. Where you have a rock of a soft nature close to one of a hard nature, a fault or slip takes place, and that is generally supposed to have caused the great San Francisco earthquake.

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DRAINAGE AND THE DRAINAGE ACTS.

BY C. A. JONES, PETROLIA, ONT.

Mr. President and Gentlemen,—In a moment of weakness or absent-mindedness, I really cannot tell which, I complied with the request of our worthy Secretary, that I should write a paper on Drainage and the Drainage Acts, but when I afterwards began to deliberate in a quiet, pensive mood, upon the subject, I thought how foolish I had been, for I could think of little or nothing except what had been pretty thoroughly threshed out at previous meetings, which left me in rather an awkward predicament. However, I shall endeavor to bring before your notice a few points which may be of interest to some of the members who are actively engaged in drainage work.

A case which for the first time during my practice occurred last year, was one in which the parties owning land on the north side of a blind line petitioned for a drain to run along the southerly side of said blind line, not for the drainage of their own lands, but to cut off the water flowing on to them from the lands on the other, or south side of the blind line, which were not included in the area described in the petition. The lands on both sides were, of course, assessed for the cost, and the parties on the south side from whose lands the water flowed, appealed to the Drainage Referee, and I was called on in the interests of the respondents. His Honor held that the parties petitioning had the right to do so, even though they admitted in court that the work was a cut-off for them and not for drainage, as they drained their lands into another drain which ran through the opposite end of their farms.

Another point which has come to my notice recently is this: Has a single individual the right to petition for a drain under Sec. 3 of the Municipal Drainage Act by including his own farm or contradiction constitute a majority? I have not as yet had a only, in the area to be drained, by which he would without doubt or contradiction constitute a majority? I have not as yet had a case such as this come before me, but I have heard of one being successfully carried through. I believe it was not contested in any court to test its validity, and I should be pleased to hear from any of the members if they have had any experience in a case of this kind, or if they know of a decision in any court on this point.

If I may be permitted, I would suggest a few amendments to the Drainage Acts, as follows:

Sec. 85 of the Municipal Drainage Act, I think, should be repealed. This section refers to an agreement being entered into between the Municipal Council and the railway for the construction of drainage work on or across the property of the railway company, and the consent in writing to said agreement by the majority of the owners interested in the said drainage work; but Secs. 250 and 251, Cap. 37, of the Revised Statutes of Canada, 1906, does away entirely with the necessity of this, and places the railway company on the same footing as any other land owner, excepting that it gives the company the privilege of doing that portion of the work which lies on their right of way, and also the right to appeal to the Board of Railway Commissioners if they are not satisfied with the proposed work. The same may be said of Sub-Secs. 1 and 2 of Sec. 21 of the Ditches and Watercourses Act, which reads nearly the same as Sec. 85 of the Municipal Drainage Act, and Sub-Sec. 3 of said Sec. 21, which refers to the $1,000 limit of cost of work, could be slightly amended in its wording so as to read properly with Sub-Secs. 1 and 2 omitted.

Should the above amendment to the Ditches and Watercourses Act be made, then Sub-Sec. 2a of Sec. 16 would, I think, be unnecessary. It reads as follows: "The period prescribed for the engineer to make his award shall be exclusive of the time required to obtain the approval of the works or the specifications or plans thereof by the Board of Railway Commissioners for Canada where such approval is necessary."

Again, Sub-Sec. 2 of Sec. 66 of the Municipal Drainage Act, which reads as follows: "Where in any such case lands and roads in another municipality are assessed for the drainage work, the Council of the initiating municipality *shall* procure an engineer or surveyor to make an examination of the work and to report upon it with an estimate of the cost of completion for which sufficient funds have not been provided under the original by-law, and shall serve the heads of the other municipalities as in the case of the original report, plans, specifications, assessments and estimates; and the Council of any municipality so served shall have the same right of appeal to the referee as to the improper expenditure or illegal or other application of the drainage money already raised, and shall be subject to the same duty as to raising and paying over its share of the money to be raised, as, in the case of the original by-law, is provided by sections 62 and 63,'' is scarcely workable, as an engineer coming on the work at this stage finds it difficult to give an exact estimate of what it will cost to complete the work. If the contract is let by the rod, then the council or commissioner on the work will know exactly what it is going to cost to do the work, and if it is by the cubic yard, then the engineer coming on in the middle of the work has little or no better means of giving the exact estimate than the engineer who laid out the work in the first place. Again, how does the engineer know what has been expended either for actual work or for incidental expenses such as solicitor's fees, erpenses, say, for Court of Revision, appeal to County Judge or Drainage Referee, or what bridge allowances may or may not have been paid, which would all be included in the total estimate of cost to complete the drain.

Would not this section be better amended somewhat after the following manner (3rd line): shall immediately after the completion of the work procure a statement or report of the total actual cost of the work, certified to by the treasurer of the municipality and the engineer or commissioner in charge of the work, and if sufficient funds have not already been provided for under the original by-law, the Council of the initiating municipality shall serve upon the heads of the other municipality or municipalities as in the case of the original report, a copy of the said statement or report, showing the amount advanced out of the general funds of the initiating municipality for the completion of the drainage work, with a demand for their pro rata share of same, and the Council of any municipality so served shall have the same right of appeal, etc., etc.

DISCUSSION.

Mr. Bolton—I think you all would agree with me that there are a good many things in the Ditches and Watercourses Act that could be made a great deal plainer, and also as far as the Drainage Act is concerned. There is one point in Mr. Code's report about the County Judge going on the land. I know I have had considerable experience myself in that way, and I have found it is a very hard matter to get a judge to understand conditions: as a rule he is going along and walking over the land, and if it is a particularly fine or a wet day, he is paying more attention to the weather than the conditions on the ground. You cannot get a judge to get into his head the conditions on the ground; and I think if a referee were appointed, a man of experience in law, and a man who has some knowledge of engineering and surveying also, it would be a much better thing. I think in both of these papers there are some very good suggestions.

Mr. Code—The point taken by Mr. Bolton is simply in line with what I have always thought. It is very hard to get a judge to go out and take a look at things. We have to give judges all the credit due them, they are legal lights, but their engineering knowledge is necessarily restricted, and the main trouble I find is that legal gentlemen never see mathematical proportions. If we could only get them to see things in mathematical proportions it wouldn't be so bad. But, the present referee lately has taken a good step when he starts to make an examination in every case that comes before him. The trouble is that then we see each of the two sides, the barrister and somebody else will provide him a rig and take him out and show him the place. However, he gets around that in very good order. In Mr. Jones' paper he mentions giving notice to other townships than the initiating township. I think we could get around a good deal of that by placing our estimates high enough, and giving them the rebate, instead of asking them to put up more. Although the point is well taken, I find it the case that an estimate is not nearly high enough often.

I don't think there is anything I can add, except I always try to discourage any work under the Ditches and Watercourses Act. In the eight or nine townships I act as engineer for I suppose there are not more than three or four awards to make under the Ditches and Watercourses Act. I have tried to educate them in that matter, and it is working well.

Mr. Newman—As to the appointing of a surveyor and two assistants to him, it seems to me that the whole nature of the Ditches and Watercourses Act is for small and unimportant drains that the cost in every case should be reduced to a minimum, and for that reason, principally, among others, I don't see the value of two assistants. If a surveyor goes onto the ground and makes a through examination of it himself and then hears the evidence of the parties interested, I don't see why he is not thoroughly capable of giving a fair and impartial decision on it, by using his own judgment; whereas, if there were two others he would be simply the presiding officer. I really don't see the advantage of it from a monetary standpoint in particular, or from a practical point of view.

Mr. Ure—I think that section is practically a dead letter. I notice, in my experience, I have never had a case.

Mr. Newman—I didn't mean for drainage viewers, but speaking of Mr. Code's recommendation of a surveyor and two assistants in place of the County Judge.

Mr. Ure—I thought you were referring to that section where two viewers were appointed. I don't know of a case where that has been carried out. It has never been carried out in any of the townships for which I act.

Mr. Newman—That is wholly optional, at all events.

Mr. Ure—As far as leaving the matter in dispute to the County Judge, I have never had any trouble in that line. I have a great many cases under the Ditches and Watercourses Act, but I have very few appeals, probably not one in five years, on the average, and in such cases the judge has always viewed the ground, and he has refused to accept the evidence of the interested farmers as against the disinterested engineer. He has told them plainly if they wished to succeed they must employ another engineer to go over the ground and show him plainly that the award was wrong, or else he refuses to make any changes. I don't know that there is enough work or enough appeals under the Ditches and Watercourses Act to make it worth while to appoint a referee; I doubt very much if there is. There are some amendments proposed there which I think it ought to be someone's duty to look after. The Statutes are being revised. Section 85 is a dead letter and might as well be wiped out. Possibly it will be. In the revision of the Statutes the men take cognizance of the Dominion Act under which railway companies are now dealt with. There are some amendments to the Ditches and Watercourses Act, I believe, being proposed at the present session. I rode down on the train with a member from South Oxford, who proposed to wipe out this distinction. There are some sections of the Act that apply to Counties east of Frontenac and do not apply to Counties west of Frontenac. He asked me why that distinction was made. I couldn't tell him, unless I thought probably some member down east of Frontenac had a particular case he wanted to cover. He was proposing to wipe out that distinction. One of the sections dealt with the rods—they have 90 rods east—and he asked me if I thought a greater limit should not be placed also in the west. I think a great amount of justice would be done if the limit were placed at probably 150 rods. We, of course, take conditions as we have them and make the best of them; still, the law could be improved. I think the Ditches and Watercourses Act is being used less than it was, and will be used much less in the future, because under the amendments passed about two years ago to the Municipal Act, one or two petitioners can put through almost any drainage scheme they wish, until the courts decide or give a ruling upon the meaning of that amendment. At the present time I know, I myself, and other engineers, are putting through numerous schemes this year that could not have gone through at all before that amendment was made. None of them have been contested, so that we cannot tell how the courts will rule; that is with reference to limiting the area described in the petition to one or two or three lots and getting the majority of those to sign the petition. It has gone through all right so far. I don't know how it may fare when it gets into court.

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THE PEACE RIVER DISTRICT.

BY H. W. SELBY, O.L.S., TORONTO, ONT.

Although this subject is not essentially one to interest the Ontario Land Surveyors, in view of the fact that we have a north country as interesting, if not more so, than the subject of this paper, still I thought a few remarks relating to that distant portion of Canada might broaden our ideas and make them less parochial in their limitations.

The Peace River District is that portion of Canada which lies nearly in the centre of the territory granted to the Hudson's Bay Company by Charles the Second in the year 1670, and purchased by the Dominion Government from the company in 1869. Up to that date settlement had been discouraged; only the officials of the trading companies and a few intrepid explorers had ever ventured within its borders. Little had been known to the outside world of the great possibilities of this enormously rich area of land, until the past few years or upon the advent of the railways into the prairie portions of the country. Now the last West is being invaded, and after that, where next? According to the statement of the naturalist, Ernest Thompson Seton, who has lately returned from a trip into the so-called "Barren Lands," or, as it is termed by another writer, "The Top Country" of the continent, there is a whole Province of good arable land northwest of Hudson's Bay awaiting the coming of the adventurous spirits, where the conditions are such as to lead to the conclusion that what has been done in Manitoba and Ontario even can be done up there. In the words of a writer in the Technical World Magazine, "The Barrens of the North" is what they "used to call this whole Top Country;" but Nature never did such bad balancing as to weigh down a continent, whose "lower regions are inestimably rich, with a worthless top, and to the north end of the American Continent it gave a full share of attractiveness and riches. They are a bit hard to get at, it is true, but Nature's idea in cachéing them thus far away probably was merely to keep them in reserve until men needed them enough to go after them."

Any further digression from my subject must be left for some future time. Now I will take you through the Peace River District only. First, let me ask you how many realize how far one has to travel to reach Edmonton, the rising city of the West, but still only the gateway to the great country beyond? Do you know that in travelling by express train from Montreal to Edmonton within a few hours of as much time is occupied as it takes a C. P. R. steamer to cross the Atlantic Ocean? Do you still further realize that by travelling as far as from Montreal to Toronto, in a north-westerly direction from Edmonton, a settlement of about one thousand people are found living comfortably and growing all the grain and vegetables required for the use of the community, and raising more cattle and horses than are required for the various purposes of that number of people, and that means many more than would be found among the same number of people here? Then continue northerly another three hundred miles, you pass through a settlement on the Peace River of over two hundred people living upon good farms, growing everything needed by man and beast, and down the Peace River to another settlement of over two hundred, where there are farmers growing from 75 to 300 acres of wheat annually, which is ground in an up-to-date roller process flour mill and then shipped still down the Peace and Mackenzie Rivers, on electric lighted steamers, and distributed among people living nearly as far from Edmonton as the people of Halifax from London, England. Why, gentlemen, it is hard to realize anything about it without actually travelling the country over. Those who have never been west of Sudbury will find it difficult to appreciate how far one can travel in Ontario before seeing the first glimpses of western life. After one has become fully conscious of what that means, it will then be possible to have a conception of what travelling over three times that distance means, and still to be in Canada, and not only in Canada, but in a good land, not, as depicted by Kipling as "Our Lady of the Snows," but in a land where agriculture in all its branches can be followed; where fruits and flowers in all their lusciousness, beauty and perfume are found, and where the horse (the pride of our eastern fellow-citizens, that is housed, petted and blanketed) out there roams at large, feeding on the luxuriant grasses all the year round, with the flimsiest of shelters provided in case a severe storm should render it necessary to feed him with hay for a short time. Railroads have shortened the distance from one place to another so much we lose the feeling of vastness truly applicable to the extent and beauty of our great and prosperous Dominion.

We will now begin our journey to the Peace River country from Edmonton, a city which in 1903 had a population of less than 2,000, and which by the latest census claimed 19,000 dwellers therein surrounded by a fertile plain, every section having one or more occupants, for from 50 to 75 miles in almost any direction, growing everything required for their food except some kinds of fruits, with unlimited supplies of coal underlying the whole district, and with lumber and other building material of easy access.

From this city of great promise we travel over a fairly good wagon road northerly 96 miles to Athabasca Landing. Some of this country is not surveyed nor settled, but at intervals good shelter for man and beast is found at reasonable prices, with hay and oats for the horses and meals for small parties at 35c per meal. At Athabasca Landing a message can be sent by wire to your partners, wife or sweetheart. This village is organized, has police protection, and nearly all the annoyances of civilization except the sound of the steam whistle on the railway engine. This is expected soon. It is beautifully situated on the bank of the Athabasca River, from which the general level of the country rises in plateaus about 500 feet. Down the river a great deal of the merchandise for the north is sent by steamer and large flotillas of barges, the loading and departure of which in the summer months gives the village a very busy appearance. Quite a number of farmers have settled within easy distance, and most of the oats required by freighters and others is grown by them. From this place, going by steamer up the river 75 miles, we reach the Lesser Slave River, then up 20 miles of rapids by York boat and 100 miles by steamer across Lesser Slave Lake. If driving, there are wagon roads on the north and south shores of the River to Lesser Slave River, then by a good road to Lesser Slave Lake; thence around the lake, following the beach, to the village at the west end of the lake. This village is at present the objective point for all people coming into the Peace River country. Here one can rest awhile, to make necessary repairs, replenish the larder, go to church, or do anything you may require to do, besides acquiring information as to the country beyond. Here are found the Roman Catholic and the English Church Missions to the Indians; both with good buildings and churches, stores, sawmill and flour mill. Both have farms and cultivate enough land to raise wheat and oats for their own use, and cattle for milk, butter and beef. Opposite the village are large meadows, where thousands of tons of hay are put up, and where hundreds of horses and cattle pasture, many of them all the year round. Here on the first of July, and sometimes for two or three days after, hundreds gather to celebrate our national holiday, coming from all over the country to join in the sports and visit their friends. These sports consist of horse races of all kinds and for various distances; riding contests for men and women; running races for all classes, male and female; jumping, high, flat and vaulting; trick races of various kinds, such as "100 yards dash and come in with your pipe lighted," 100 yards race carrying a man and returning, having changed places; obstacle race, over and under all sorts of hurdles, bars, wagons, nets, etc. The cowboy race is generally well contested, and a race for half a mile, removing the saddle while running, is keenly enjoyed. These celebrations are held generally on a flat some three miles from the village, where each family erects its habitation (a tent or tepee), bringing supplies and blankets for the holiday. Large tents are put up for restaurants, where those not provided with food can get their meals and where ice cream of the most delicate flavor is sold to the unsophisticated, and fruit, candies and nuts for the young people who desire nothing better than getting rid of their money. Some of the horses are tethered out and many roam at large. Gambling and betting on the several events is indulged in to an unlimited extent, at least to the extent of their pile, and when that is gone to the extent of all they can borrow. Music and dancing engage the attention of the young men and women from nightfall to early morning, and dresses white in the evening look very much soiled by morning. This celebration has become an institution of the country, and the busy and picturesque canvas town given over for two or three days to sport is visited by the stranger with almost as much interest as one visits the Mardi Gras in the south or the National Exhibition, with its attendant attractions. One naturally wants to know why so much is said to entice people to this far-off land. Is it a purely agricultural country? Or are there fortunes awaiting those who want to invest in timber; or is the possibility of finding rich deposits of minerals the attraction? No, I think not. It is the natural "Lure of the Labrador" feeling; the desire of so many of our restless fellowmen to see the West. They have heard of others who have gone west and made money. "I will go and see the West," they say, attracted by the language of some of the many articles written upon the subject. I will quote a few extracts from a widely circulated paper, the highly colored language of which, like the enticing literature of a systematically advertised patent medicine company, acts with impelling force and results in probably the same proportion of success and disappointment.

"Coal, oil and gas are the three wonder riches of the north. Timber and fur, iron ore, and even gold, one would expect to find as typical northern resources. The whole north land above the present line of rail is a region of mineral wealth which in its nearer limits takes the form of the largest gas and oil reserves in the world, and farther north of coal beds no one knows how large.

Where Nature has been so lavish as to keep burning up and still have plenty left, it may be taken that she is filled and soaked with combustibles—solid, liquid and gaseous—and there is every evidence of great subterranean lakes of petroleum. There is hematite iron ore; gypsum near the mouth of the Peace River; stone suitable for building; clay that will make brick, and sand which can be turned into glass. There is gold in the sandbars on the Peace River in such quantities that miners have been panning out from ten to fifteen dollars per day, but the greatest of the north land surprises are those of the farm land. Instead of the vast stretches of empty barrenness with which the north has been synonymous, there are tracts of rich prairie identical in character and possibilities with those to the south. The Peace River country is claimed to be one of the most fertile districts in the West, and in every way fitted for agricultural settlement. It is a country of rolling, flower-strewn prairie, where wheat grows 30 bushels to the acre and oats 100. Fort Vermillion, 700 miles straight north of Edmonton, is the farthest north agricultural settlement in America, and there a crop of 20,000 bushels of wheat from something less than 1,000 acres was one man's record last year. At Fort Providence, in latitude 61.25, the middle of July in a normal year finds potatoes in flower, peas fit to use, strawberries ripe and gone, and nearly every variety of garden vegetables and fruits in healthy growth; and Fort Good Hope, ten miles south of the Arctic circle, produces potatoes any farmer in Aristook County would be proud of, and while this comes of tillage, the northern soil of its own natural richness grows aspen, poplar, birch, all along the Mackenzie River to its Delta, and spruce almost to the Arctic Ocean. Both timber and wheat are milled at Fort Vermillion, where a well equipped roller process flour mill grinds the grain grown in the district, and a sawmill produces lumber from native-grown spruce and tamarac."

While every word of this is to a certain extent true, still to the ordinary person who takes such things to be simply as stated, after he has gone, seen and discovered the truth, is very likely to be always a disappointed man. Now this is unfortunate, because the Peace River District, and hundreds of miles on either side of it, will be the home of many thousands of happy and contented farmers in the future, and many towns not thought of yet will spring up as centres of mining districts. Railroads will soon be built into the north, but it will be mainly through a bush country. The prairies spoken of so attractively in the article quoted from are narrow strips, a few miles in length, generally along the bank of a river or lake. The timber areas, that is to say, those suitable for timber berths, are almost unknown, but small belts of spruce are found scattered all over the district north and west of Edmonton, from which sufficient for the needs of the settler may be cut. No large areas of poplar over 18 in. are found, but scattered nearly all over the district bluffs of large poplar, white and black, and cottonwood, have been seen, but generally on the land suitable for agricultural purposes the timber is small poplar and willow. Large tracts of the country consist of rough hills, with the attendant coulees deep cut by the spring freshets, and many muskegs occupy thousands of acres. Of course much of this country might be utilized, but it is a question for serious consideration whether the authorities should not reserve these from settlement or occupation or even drainage. A large area of land is lost for settlement along the shores of nearly all the large rivers and the smaller streams which empty into them, from the fact that these streams have cut a channel from 500 to 1,000 feet deep through the country, and by a succession of landslides, in some cases as far back from the river as a mile and more, has left the country too rough to cultivate. Small flats have been formed here and there along these large rivers, which when settled upon invariably produce the best of grain, etc. Frost never affects these flats, since a fog or mist always occurs after a frosty night, which protects the growing crops from the first rays of the sun and until 9 or 10 o'clock. The climatic conditions have been a great surprise to the public generally. The observations as to temperature have shown that the Isothermal line of 57.30 in the three summer months extends northwesterly from Lake Manitoba to Lake Athabasca, and thence westerly and southerly along the foot of the Rocky Mountains. This line includes an area of land greater in extent than this great Province of Ontario, in which the climate is suitable for successful agriculture. This is largely owing to the low altitude of the country and the length of the day, which is nearly 20 hours in summer. The Peace River District lies well within this area of successful agricultural possibilities, and that taken together with the long day of sunshine and the influence of the winds from the Pacific, with rather more than the usual rainfall, constant growth is the result. In fact, observations have shown that wheat has matured in 86 days from the time it was sown.

I have endeavored, gentlemen, to give you a mind picture of the Peace River District. This has been done, I hope, faithfully; much wealth may be made there; many people may live there; large areas of land may never be occupied. Many may go there and not realize their expectations, which may be said of all portions of this continent. It might very rightly be argued that the trend of emigration would be better directed if the clay belts of Ontario and Quebec, and even north parts of New Brunswick, were first occupied. I am not here to say anything on these points, for or against, but will close my remarks with a few figures compiled by the Census Bureau relating to the occupied part of the Northwest, which may be as applicable to the unoccupied country, which is probably as good as that from which these figures are taken.

Up to the end of the year 1907 eighty-five million acres of the Northwest had been alienated from the public domain. Out of this immense area five million only were under wheat crop last year. We will suppose that the selection of this eighty-five million acres did not include any great areas of land not suitable for agriculture, but to be safe on this point we will say twenty millions, or nearly 25 per cent., are not fit for that purpose. The wheat crop then stands in the ratio of 1 to 13, or representing about seventy-five millions of bushels of wheat, and applying the same ratio to the possibilities of the Peace River District and the country within the area of which it has been stated successful farming or wheat growing can be carried on—a country greater than that of the whole of Ontario, and the figures almost paralyze one—add to these, if you can, the mineral wealth of that large tract of country, and even as loyal citizens of this great and rich Province, we may still, without treason to our beloved Ontario, be proud that we are Canadians.

[*This Association is not responsible, as a body, for the opinions expressed in its Papers by Authors.*]

OUR TIMBER RESOURCES AND LOSSES BY FOREST FIRES.

BY J. F. WHITSON, O.L.S., DEPARTMENT OF LANDS, FORESTS AND MINES.

What has become of our original forests? What use have we made of them, and what steps are we now taking to preserve for future generations their supply of timber, are questions which I deem worthy of consideration by this Association. As our future success as Land Surveyors is in a great measure dependent upon the development of the timber, agricultural and mineral resources of Northern Ontario, we must not lose sight of the fact that the preservation and judicious management of our forests are invaluable factors in the interests of colonization, the maintenance of our Provincial revenue, and the employment of labor. It is more particularly, however, the question of forest protection I wish to draw the attention of our members to in this paper.

Lumbering began in Canada over two hundred years ago on the St. Lawrence. Operations reached the City of Ottawa a hundred years later. In 1806 the first raft of square timber floated away from the mouth of the Gattineau; for the next 50 years operations in Ontario were confined almost exclusively to the Ottawa River and its tributaries, and the Trent waters below Peterboro.

Between 1800 and 1855 we had cut out the finest of our white pine forests. As early as 1840 operations had extended almost to the head waters of the Madawaska and Bonnechere, and had reached Lake Traverse, on the Petawawa, as early as 1855, and in that year square timber was made on the Jocko, at the foot of Lake Temiskaming. In 1856 no less than three and one-half million cubic feet of board timber was cut on the Madawaska and 15 million cubic feet above the City of Ottawa. Lumbering operations were also active on the Trent waters as early as 1840, and had reached Indian Point, on Balsam Lake, in 1855, and 60 miles up Burnt River and far into the interior in 1860.

Little or no lumbering had been done in Western Canada except for local consumption, until 1858, when the first raft of square timber left Big Creek, on Lake Erie, for Tonawanda. Square timber and spars were shipped from the vicinity of Barrie, Orillia and Angus, near the Georgian Bay as early as 1864; logging had even begun on the north shore of Lake Huron, on the Spanish as early as 1863, and a few local mills had started operations before that time. Little had been cut in Muskoka, Parry Sound, Nipissing or Haliburton District until after 1860. From 1860 to 1870 operations were pushed north through Addington, Hastings, Haliburton and Muskoka, and along the shores of the Georgian Bay. Between 1870 and 1885 operations had reached the shores of Lake Nipissing from the east, south and west, and were active in many places along the north shore of Lake Huron from the French River to the Soo, extending inland for a distance of 40 miles.

Between 1885 and 1907 operations have extended into all the new districts and have in many instances reached the head waters of the streams flowing into Lake Huron or the Ottawa River, have extended as far west as Rainy Lake and Lake of the Woods; in fact, lumbering has been carried on wherever a pine tree is to be found, and I verily believe that if reports had been published years ago that there was a raft of square timber to be had around the North Pole, it would have been located long ago.

Prior to 1857 the Province was divided into four sections, according to the character of the pine:

(1) The white pine country, extending from the City of Ottawa to Pembroke, having a length of about 100 miles and an extreme width of 40 miles, covering the Counties of Carleton, Lanark and Renfrew.

(2) Beyond that the red pine country, extending from Pembroke westerly to Lake Nipissing, a distance of nearly 130 miles, having an extreme width of 50 miles.

(3) The hardwood country, covering the territory at the head waters of all the streams flowing into the Ottawa, Lake Nipissing and the Georgian Bay, or what is now included in our Algonquin National Park.

(4) The rocky and isolated region on the shores of Lake Huron, which was then practically unknown.

The white pine country, which was more or less an agricultural country, has been all cut over years ago or destroyed by fire. The same remarks will almost apply to the red pine district. The hardwood country has nearly all been square-timbered over, and in fact logged over, although there is still a few billion feet of pine still standing. The country to the east of Lake Huron and to the north extending inland many miles, has since that date been partly lumbered over or partly devastated by fire, and to-day the greater quantity of our pine timber still in the Crown is to the north of Lake Nipissing and west of Lake Temiskaming, and on the head waters of the streams flowing into the Georgian Bay and in the District of Rainy River, north of the Minnesota boundary.

The most valuable of our hardwood timber was burnt by the early settlers when clearing off their land, or used as fuel, and to-day there is no hardwood forests left to compare in area or quality like the original forests of the Indian Peninsula, the Huron tract, or the older part of Ontario bordering on Lakes Erie and Ontario, as hardwood is found only in small sections north and west of Lake Huron; neither can we compare our present pine forests to those which have been cut or burnt over in the last 50 years.

FOREST FIRES.

It is to be regretted that careless operations in the past by lumbermen have done much to lessen the supply of timber in this Province. On carefully examining the reports of the surveys and explorations made prior to 1855, I find that nearly all of the Huron and Ottawa territory, including the Districts of Haliburton, Muskoka and Parry Sound, the Counties of Addington, Hastings and Renfrew, were practically a virgin forest of mixed timber, pine predominating, with only parts of a few townships burnt over. Prior to 1860 a virgin forest covered the territory on the upper branches of the Trent waters. In that year, however, a fire broke out on the Burnt River, in the Townships of Snowdon and Glamorgan, in Haliburton, caused by a trapper's smudge. In 1851 the first fire of any magnitude to visit the Ottawa Valley commenced at the mouth of the Bonnechere River and burnt over what was locally known as the Big Pine country. This fire originated from the burning paper of a musket fired by a river driver. In 1868 the Bissetts Creek country, from the Ottawa River to Lake Traverse, on the Petawawa, was devastated, and in 1870 the Skead limits on the Opeongo. In 1876 the country from the Petawawa to the Bonnechere River met the same fate, having arisen through the carelessness of a river driver. In these few fires alone the Province lost several billion feet of our finest white and red pine. To-day you will scarcely find a township in the white and red pine country that has not been burnt or partly burnt over, and in many instances the fires have swept over them several times.

A. P. Salter, who between 1855 and 1857 outlined the north shore of Lake Huron from Lake Nipissing to Sault Ste. Marie, and extending back from the shore nearly 40 miles, describes the country as a vast forest of green timber, scarcely a burnt area was met with. The country was not as heavily timbered with pine as was the Ottawa Valley; there was, however, large areas of excellent pine and other mixed timbers. Since that date a series of fires have reduced the pine area north of Lake Huron by almost one-half.

They began in 1864. The fire of 1864 was the first destructive fire to devastate the north shore. It began near Otter Tail Lake, on the Thessalon River, and worked its way west into the old cutting around the Bruce Mines and east to Blind River, where it reached some old saw log cutting by a French-Canadian by the name of Salvoil. Continuing east along the shore, it reached the mouth of the Serpent, where it destroyed a local mill owned by Lauzon; here it met fresh fuel in the old cuttings and continued east to the Spanish, and up that stream for many miles, almost the entire southern slope of the Killarney Mountain being swept over from White Fish west to Collin's Inlet. While this fire was burning, a fiercer fire was, in August of the same year, working its way west from the west arm of Lake Nipissing until they met somewhere in the Valley of the Wahnapitae. But this was an incipient fire compared with the one which followed it in 1871. The fire of 1864 followed the dry, moss-covered rocks and small pine ridges, but when it struck a deep swamp or muskeg it stopped or smoldered until it was revived by high winds or found fresh fuel in some of the old timber cuttings. The winds and storms of six years leveled down the dead timber, piling windfalls around the skirts of swamps and muskegs. The fire of 1871 started almost at every point of the compass along the north shore from French River to Kaministiquia, on Lake Superior. The season was exceedingly dry and hot. It swept over the dead timber and brule of 1864, destroying swamp barriers that saved the pineries six years before; clouds of smoke, tipped with a fringe of flame, swept from one hill-top to another, lakes, rivers and swamps formed no barriers or protection. Township after township was swept over to the south of the French and millions of pine destroyed. It extended up that river, along the west shore of Lake Nipissing, up the Sturgeon, swinging around westerly, it crossed the Wahnapitae and continued to the head waters of the Spanish, up the Vermillion, and west to the head waters of the Mississaga and down that stream for over fifty miles. This fire swept with fierce energy over an area of more than 2,000 square miles, leaving black ened and giant pines to be a reminder for more than half a century of the immense destruction there and then caused, converting a virgin forest into a barren and desolate wilderness.

During the same season numerous smaller fires broke out in different parts along the north shore of Lake Superior, around Port Arthur and points east. Exploration surveys were then being made of the Canadian Pacific Railway, and many fires were started through carelessness on the part of men employed. An axeman on Mr. David Beatty's exploration party started a fire by burning out a wasp's nest on the line east of Red Rock, on the Nepigon River, which Mr. Beatty was unable to quench. He and his party were forced to flee for their lives and take refuge in a stream, but unfortunately six of his packers were overtaken and perished in the flames.

Probably a more extensive fire than that of 1871 was the fire of probably 1855, which was started by an Indian on Lady Evelyn Lake, while burning over a blueberry patch, which burnt easterly to the shores of Lake Temiskaming, up the Montreal River to its source, and westerly along the height of land for over 200 miles to near Michipicoten, on Lake Superior. Surveyors Salter, Gilmour and Sinclair, in their reports of 1867 of their base line from Michipicoten to the Montreal River, describe vast areas of burnt-over territory, and from the trunks of trees then standing they were able to state that the country at one time contained a heavy growth of pine. I can do nothing better than quote Salter's own words: "Almost the whole of this district appears to have been devastated by fires at different times and at periods more or less remote, which swept away the original forest, some remains of which are still to be seen in the shape of huge trunks of pine, blackened and charred by the fire. The country to the north of my line along the height of land has been swept over by fire, and now is for an area of 2,000 square miles a desolate wilderness, and from the remains still standing was formerly covered with pine, etc."

Vast areas west of Lake Superior, along the southern boundary of the Province as far as Rainy Lake, which at one time contained large quantities of pine, were destroyed prior to 1857, probably about the year 1845. These fires burnt over thousands of square miles, both in Ontario and Minnesota. From the top of a high mountain on Hunters' Island no less than 1,000 square miles of just such country can be seen, extending as far as the eye can carry in almost every direction.

Coming down to more recent dates, I might mention the fires of 1877, which burnt over extensive areas in Parry Sound; the fire of 1891, which swept along the Canadian Pacific Railroad for nearly 60 miles from Pogamasing Station to near Woman River, and a more recent one which burnt over the same territory in 1896 and the entire shores of Biscotasing and Ramsay Lakes, and from the head waters of the Spanish and Mississaga Rivers to near Flying Post, north of the Height of Land, a distance of over 70 miles. These two fires alone devastated over a million and a quarter acres. Being an eyewitness of this fire, I am able to form some idea of what a forest fire in a pinery in a dry season is, and how utterly impossible it is to check it. I might also mention the fires of 1894, which swept over Northern Minnesota, destroying over 140 souls, which fire crossed Rainy River into the Rainy River Valley, burning over several of our newly-settled townships and destroying the lives of six members of a family by the name of Gamsby.

I might mention numerous smaller fires, all of which have played their part in destroying our forest wealth, but space will not permit.

RAILWAY TIES.

One of the greatest drains on the timber resources of this Province is the consumption for railway ties, telegraph poles, bridge timber, etc., being nearly one-fifth of the entire output.

The total length of railroads under operation in Canada at the end of 1907 was 22,450 miles, with 3,000 miles additional under construction, besides 1,067 miles of double track, or in all a total length of 27,600 miles, including sidings. Of this length, Ontario has the greatest mileage, totaling 7,640 miles. It required 83 million ties in the original construction of these railways, 23 million of which were used in Ontario, nearly 3,000 ties being required per mile. It is estimated by railway companies that the average life of hemlock, tamarac and jack pine ties is about seven years. From these figures it will be seen that in every seven years the railways of Canada will require nearly 83 million ties to keep their lines in repair, of which Ontario's share will be 23 millions, or an annual requirement of 12 millions for the Dominion. In Ontario for the next five years we will require annually, including new lines, 4½ million ties. Within the next five years at least 1,500 miles additional of new lines will be constructed in Ontario, 1,000 miles of Transcontinental line, 200 miles by the Grand Trunk Pacific from Fort William and Lake Superior Junction, and about 300 miles of Canadian Pacific and Canadian Northern lines, not to mention other short lines, making a total mileage in 1912 in Ontario of over 9,000 miles. We will then require annually, in Ontario, four million ties to keep the roadbeds in repair. It is estimated that one million ties will cut out from 26 to 32 million feet of lumber, so that the railways of Ontario will require, per annum, 120 million feet in B. M. for ties, besides large quantities of bridge timber, telegraph poles, etc. How we are to meet this demand is a problem hard to solve, for the demand to-morrow will be greater than to-day and the source of supply less.

The C. P. R. Co. has been in operation about twenty-three years, and in that time nearly all the tie timber along almost the entire line of railway from six to twelve miles on either side, except in a very few localities, has been cut over or destroyed by fire, and the same remarks will almost apply to the Canadian Northern from Port Arthur to Winnipeg, although in operation less than half that period, and the companies have now to draw their ties long distances or bring them in by branch lines or streams. Manitoba and the Territories have very little tie timber, and must look to this Province for a partial supply, and to-day the Canadian Pacific and the Canadian Northern Railway Companies are shipping ties from Ontario to points as far west as Calgary and Edmonton, as they find it cheaper than to bring cedar ties from British Columbia. A shipment of ties was made from Australia some time ago by the C. P. R. Co., of Jarrah wood, the duration of which is estimated at fifty years, but they were found to be so hard that no spikes could be driven. They cost $1 per tie at Vancouver. Spruce will not make ties, although occasionally used; the life, however, is not more than from three to four years, and cannot be used where there is heavy traffic. We must, therefore, look to our tamarac, and we have no great quantity of that owing to the tamarac blight which swept over all Northern Ontario and Quebec a few years ago, killing almost the entire growth from St. John to Port Arthur; or to our Jack pine, of which we have, fortunately, large quantities in some sections, although not so much as might be expected. Not one-tenth of the timber in the virgin forests over the height of land is suitable for ties, but rather for pulpwood.

Good ties to-day are worth on the line of railway from 40c to 60c per tie, and oak ties $1. On the stump they are worth from 8c to 20c. Tie timber in the next ten years will be difficult to get within a reasonable distance of any of our railways.

Over five million ties will be cut in Ontario this season off Crown lands, and great numbers besides off private lands. The United States require annually over one hundred million ties and three and one-half million telegraph and telephone poles and thirty-seven billion feet B. M. of lumber per annum. How they will supply the demand in the near future is a problem hard to solve.

It is therefore our duty, as a business proposition, to protect by every possible means the tie timber forests now remaining in Northern Ontario, and to find some method whereby the life of a tie will be prolonged.

Throughout the entire District of Rainy River and over a great portion of Thunder Bay, we have 25 million acres of land growing up with a thrifty growth of Jack pine, spruce and small tamarac, which in twenty years more, if properly cared for, will produce millions of ties. The same remarks will apply to large sections of Algoma and Nipissing, and even to sections of Parry Sound, Muskoka, Renfrew and Haliburton. Roughly estimated, there is 30 million acres of that class of land not included in any of our forest reserves or lands under timber license, or the lands suitable for agricultural purposes in the northern clay belt, which could be made tie-producing under proper supervision and protection from forest fires. Railway contractors' careless methods in the past in cutting ties have been extremely destructful and are directly or indirectly responsible for many bush fires. In the early days of railway construction they were allowed to take ties from land adjoining the track, where most convenient. As a consequence they left a slash on both sides of their line from end to end exposed to sparks from every passing locomotive, or the careless section man, when burning off the right of way every spring. No care was ever taken in burning the debris or even piling their brush. The almost unavoidable sequence in such cases was the forest fire, and if the past careless methods of cutting are allowed to continue, we will see a tie famine in a very few years, probably in 12 or 15 years, unless it is found practicable to treat ties by some chemical process such as that used very extensively by the Carbolite Carbolineum Company of Toronto, which they claim will more than double the life of a tie at an initial cost of 25c per tie. (Railway men inform me that they prolong the life from two to four years.)

Besides, railways require large quantities of cedar for telegraph and telephone poles. There is very little of this timber north and west of Lake Superior, in fact there is very little north of the height of land. The Ottawa Valley and the north shore of Lake Huron have still considerable, but there is no cedar in Northern Ontario like that in Old Ontario, neither in quality or quantity. The pole period is probably shorter than the tie one, as cedar is not found as a second growth in the north over large areas, and only in its original forest in narrow fringes along the banks of streams or shores of lakes. The dense cedar swamp is seldom met with.

If the figures I am about to give as to the growth of timber are correct, and assuming that one-tenth of the timber growing in the north is suitable for ties, and that an acre will produce a tie every 15 years, we should then have tie timber enough to supply the growing demands in Ontario for many years to come, and perhaps indefinitely, if we can eliminate fires. We must, however, make some allowance for losses even under the best possible management, as will be seen from past records. Our present fire system, as introduced into this Province in 1886 by Mr. Aubrey White, Deputy Minister of Lands and Forests, is undoubtedly the most efficient in any Province or State, yet fires have occurred of late years which have been very destructive, although insignificant compared to those which occurred prior to 1886.

The area of the Province, exclusive of the Great Lakes, is 126 million acres. The area surveyed, 46 million acres. The area unsurveyed, 80 million acres. The area sold, 24 million acres. The area under timber license, 12,800,000 acres, in which is included some patented lands. The area still in the Crown, 102 million acres unpatented or 89 million unlicensed lands. The area of Forest Reserves, 10½ million acres. The area of virgin forests and burnt-over lands, not including Forest Reserves, 78½ million acres. After deducting, say, 8½ million acres for water and useless muskeg lands, we have 70 million acres outside our Forest Reserves to produce timber, of which 40 million is a virgin forest, almost untouched by fire, and 30 million acres of inferior land burnt over or partly burnt at different periods and timbered with second growth from one year to 50 years' growth. Half of this 30 million acres at the end of 50 years would be a fairly good forest of merchantable timber. The growth would not be less than 2½ cords per acre every 50 years, or 5 cords per 100 years. This would be equivalent to 1½ million cords annual growth on our inferior and partly burnt-over areas, but we will take safe grounds and assume that our virgin forest will produce the same amount. Then we have an annual growth of two million cords on the 40 million acres, or 3½ million cords in all, worth $2,100,000 at 60c per cord; at the lowest possible calculation, it could not be less than two million cords per annum.

PINE AND PULPWOOD FORESTS IN ONTARIO.

The Government of Ontario, with a view to perpetuating the supply of pine timber, set aside three large Forest Reserves, the timber on which is being conserved to be disposed of, subject to stringent conditions. These lands are protected from fire during the summer season by a large staff of fire rangers. Settlement is entirely excluded, also mining, where the lands are especially valuable for timber. These Reserves comprise an area of nearly 10½ million acres—the Temagami, 5,900 square miles; the Mississaga, 3,000; the Nepigon, 7,300; the Eastern, 100, and a small Reserve in Sibley Township. Besides these Timber Reserves there is the Algonquin National Park, with an area of 1,930 square miles, one object of which is to conserve the water supply at the source of several large and important streams.

On three of these Reserves there is an approximate stand of seven billion feet B. M. of red and white pine, besides large quantities of pulp and tie timber. In other sections of the Province there is also large blocks of pine, and from approximate estimates made it would appear that there is on lands of the Crown to-day a stand of 12 billion feet B. M., besides several billion on the twenty thousand square miles now under license, which is subject to a royalty of from $1 to $2 per thousand feet B. M., and on which the Crown has derived a revenue of 15½ million dollars during the last ten years, or 1½ million dollars per year, nearly 10 million of which was for stumpage dues—indicating an annual cut of from 750 million to 900 million feet B. M. At the present rate of cutting this would almost indicate a pine famine in Ontario at the end of twenty years. It is hoped and expected, however, that under the present efficient fire system and management we will be able to so far protect the young and growing pine on our many million acres of cut and burnt-over territory that the annual growth will supply the future demands.

The pine now standing is worth $10 per M., B. M., or 12 million dollars. The highest price paid for a virgin pine forest prior to 1867 was $1 per acre. In that year the north-west one-quarter of the Township of Anson, a fine pinery, brought $640 per mile. A few years ago a limit sold by the Government brought nearly $32,000 per mile, besides $2 per M. stumpage. In 1856 the revenue for all Canada from woods and forests was $228,436; 31,500 square miles were under license; 12,400,000 cubic feet of white pine square timber was cut; 748,500 white pine logs, and 1213 red pine. In 1863 the revenue from the sale of timber and for dues in Ontario amounted to $197,000, in 1870 to $426,000, and in 1872 to $600,000, and from Confederation to date, to $39,160,000; the total amounted to approximately one million dollars per year. The total cut of pine from Confederation to date amounts to over 29 billion feet B. M.

While the Province has a great wealth of pine, it is richer by far in her immense virgin forests of pulpwoods along and over the height of land, in which scarcely a tree has yet been cut. These pulp lands comprise a belt extending from the Interprovincial boundary between this Province and Quebec, westerly for a distance of over 600 miles, having a depth north and south varying from 100 to 150 miles, bounded on the south by the height of land and on the north by the swamp lands to the south of James Bay and the Albany River, the most densely timbered portion lying between the Provincial boundary and Lake Nepigon and to the north thereof, comprising an area of over 40 million acres, and although much of this area has not been explored yet, 2,500 miles of base and meridian lines have already been run through it and 100 townships subdivided, comprising nearly 2,625,000 acres, and one and one-half million acres outlined into townships. From the most reliable reports of the surveyors and explorers, I am confident that a conservative estimate of the quantity of pulp woods over this area is not less than 250 million cords. More than half of this is tributary to the Transcontinental Railway or to Lake Superior by the Nepigon River. Sixteen million acres of this territory is fine agricultural clay land, almost unbroken by lakes or rock exposures, and heavily timbered with spruce, poplar, Balm of Gilead, and Jack pine. The Transcontinental Railway is being constructed through it from east to west. It is watered by seven large rivers, the Albany having a length of nearly 500 miles, tributary streams of the Moose and Albany Rivers having each an average length of over 250 miles. These streams will act as highways to float the enormous quantities of pulp and other timber to the railway, and are capable of supplying sufficient water power for manufacturing purposes, and we may reasonably look forward to the erection of numerous pulp and paper mills, sawmills, and other industries.

A pulp mill like the one at Espanola on the Spanish River, capable of consuming from 40 to 50 thousand cords of wood per year, grinding from 150 to 200 tons per day of pulp, will employ 800 men in the woods from seven to eight months of the year, and 250 in the mill. 250 million cords will require 100 mills grinding day and night for 50 years, employing 100,000 men and teams. The annual growth over so great an area, if carefully protected from fire, will produce more pulp than is consumed annually in the United States. It is estimated by foresters that an acre of good land will produce from 25 to 75 cubic feet of wood per year, or from one-fifth to three-fifths of a cord; one-fourth of that is probably nearer the mark in our northern climate of commercial timber, say one-twentieth to three-twentieths of a cord of merchantable timber. On the clay belt and all north of the height of land there should certainly be an annual growth of two million cords, assuming three cords per acre in 100 years sufficient to supply 50 mills. The forests of Prussia produce 42 cubic feet of wood per year;

Bavaria, 55; Baden, 59, and Saxony, 90, of which possibly one-tenth would be merchantable in this country. These countries derive a revenue of from $1 to $4 per acre per annum from their State Forests. We derive less than 2c per acre, or 12c per acre from our licensed lands.

In 1906, 3,638,000 cords of pulpwood was consumed in the United States for domestic pulp, of which 738,000 cords were imported from Canada, mostly from the Eastern Provinces, as Ontario is not permitted to ship pulp out of Canada except from lands patented prior to 1897. In 1898 the United States consumed only two million cords of pulpwood. The consumption has doubled in the last ten years. In 1897 Canada supplied the United States with 102 thousand cords; a cord of pulpwood will cut about 500 feet B. M. About three-fifths of the wood used in the mills of the United States is spruce, the balance chiefly hemlock and Jack pine. A cord of first-class spruce will make a ton of merchantable pulp; on on average, however, it requires 137 cubic feet as measured in the piles. An acre of fairly good spruce will produce over 10 cords. In the District of Rainy River and south of the height of land, there is, besides the area above described, approximately 50 million cords scattered over a large area, making our total stand of pulpwood 300 million cords, which is worth from 60c to $1 per cord stumpage, and will cost in labor from $5.50 to $7.50 per cord at the mill.

The protection of this large area is a very difficult problem, and almost every year areas in some parts of the Province are being burnt over. Within the last 12 years over two million acres was burnt or partly devastated by forest fires. Railway construction parties, engineering parties, and after them the locomotive, the surveyor's careless cook, the river-driver, the prospector, the pleasure-seeker, the careless lumberman, have all done their share in burning up our forest wealth.

The pulp industry, if fostered, will mean much to the railway companies in the way of freight, to the settler by creating a demand for his produce, to the laborer and to the people of Canada in general.

Some of you no doubt have seen the great pinery which occupied the region of the Great Lakes and of the Upper Mississippi. The forests of Michigan, Wisconsin and Minnesota originally, it is estimated, contained 350 billion feet B. M.; Michigan, 150; Wisconsin, 130, and Minnesota, 70. Lumbering began in Michigan and Wisconsin in the thirties, and was of small importance till the early seventies. Since then these pineries have become almost depleted. In 1892 it reached high-water mark, when eight and one-half billion feet was cut, more than half of what we have in Ontario to-day. It is further estimated that of the 350 billion, more than 60 billion was destroyed by fire. The rapid depletion of these forests leads one to believe that possibly our supply is not inexhaustible.

You frequently hear the remark that we burn up every year by forest fires as much pine and other merchantable timber as we cut. Fires sweep over large areas almost every few years and destroy not only the timber which is merchantable, but destroys also a crop of young growing pine and other timber which was to form the future forest, and which in 25 or 50 years would be worth millions of dollars. To this must be added the injury to the forest soil and the water sources. We have in this Province to-day over 30 million acres of just such land burnt or partly burnt over at different periods, non-agricultural, requiring no tree planting, thickly studded with a second growth of young spruce, Jack pine, tamarac, balsam, poplar, birch, and in some instances red and white pine, large areas having even now attained a growth of from 10 to 30 and 40 years, which require no further care than the protection from forest fires.

It may be a very difficult matter to protect these forests from fires, yet it is done in other countries, and why not in this. The conditions are not more unfavorable. It will cost annually more than is now being expended by the Government, but what of that, if it costs double or treble the amount, what is that compared to the revenue that might be derived later on from the annual growth from over so great an area. It will cost no small amount to protect our 40,000,000 acres of virgin forest, but the annual growth on this would amply justify any Government in spending a much larger amount than has ever been spent heretofore. Why, if the annual growth of pulpwoods such as spruce, Jack pine and poplar was only one-half of one per cent., the annual increase would be nearly one and one-half million cords in the virgin forests alone, although it is estimated that a pulp forest will reproduce itself in less than 80 years. Our pulp forests have not as yet suffered very extensively from fires north of the height of land, though unfortunately the construction of new railways into that country has lessened the supply much more than has the axe.

I close this paper with these remarks.

The question of protecting our forests and the timber supply for the next generation is your concern.

You are bound by every patriotic obligation to leave this Province in as good a condition for your children after you as you found it yourselves, abusing the idea that man goes over the earth leaving a desert behind him, and this can only be done by keeping our waste lands from the ravages of fire, and if we do this the middle of this century will see as much valuable timber on our waste lands as we have consumed in the last quarter of a century. On grounds of humanity, a country is just as bound to guard against devastating fires as it is to guard against epidemics, and whether we consider the permanent interests of the lumber trade, of the settler in our new country, of the labor employed, of the public revenue, or the country generally, we are forced to regard and protect our forests next to our homes, as these are our greatest heritage.

[*This Association is not responsible, as a body, for the opinions expressed in its Papers by Authors.*]

REINFORCED CONCRETE HIGHWAY BRIDGES AND CULVERTS.

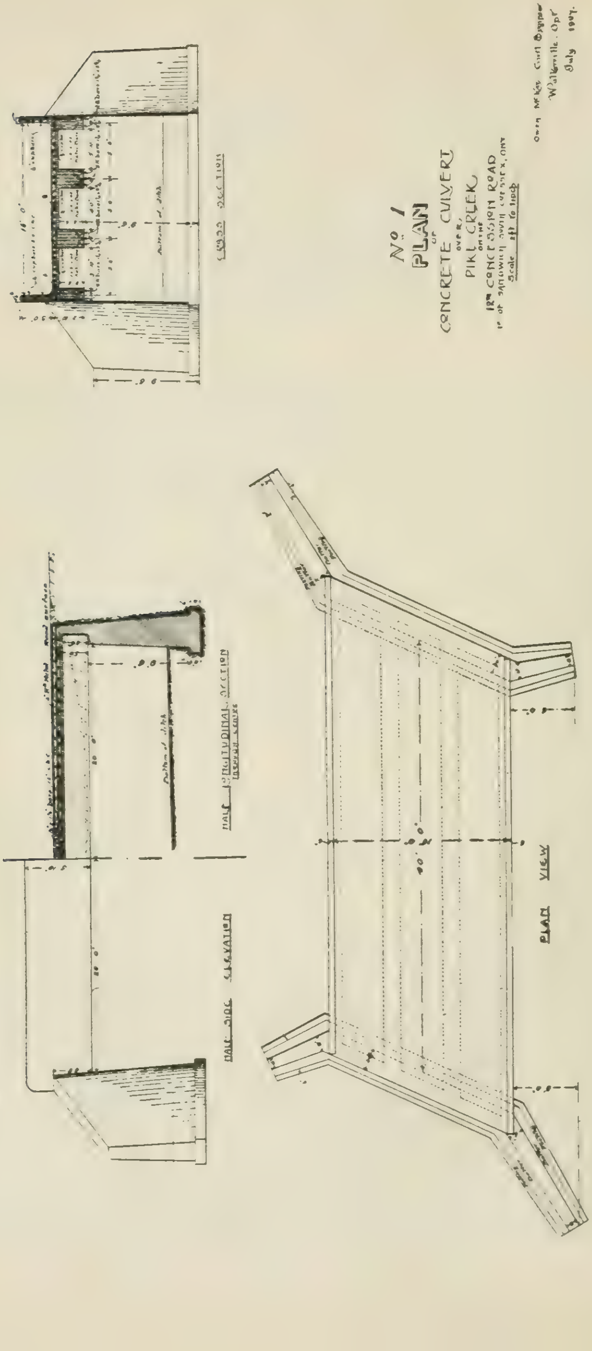
BY OWEN M'KAY, O.L.S. AND C.E.

Having prepared plans and specifications and superintended the construction of five reinforced concrete highway bridges and culverts in the Township of Sandwich South, County of Essex, Ontario, during the year 1907, I submit the following paper referring to these structures, accompanied with plans and specifications, for the consideration of the members of this Association.

The abutments in all of these bridges were constructed of concrete masonry, without reinforcements, and the floor system where the clear spans were 8 feet, 10 feet and 14 feet consisted of a solid slab 8 inches thick in the middle and tapering to 6 inches at the sides, with the two ends resting on the abutments and reinforced with the Kahn Bar system of reinforcements, excepting the 14-foot span, which was changed to 10 inches in thickness in the middle and 8 inches at the sides.

In the two bridges, with clear span between abutments of twenty (20) feet and forty (40) feet, respectively, the floor slabs in each bridge are supported by four beams or girders built into the abutments, and both girders and floor slabs reinforced by the Kahn Bar system, as shown on plans and more particularly referred to as follows:

1st. Bridge over Pike Creek. Clear span between abutments, 40 feet; width of roadway between railings, 16 feet. The two outside beams or girders are 18 inches in width and 34 inches in depth from bottom of girder to top of floor, but in the two outside girders the concrete was built up to the height of three (3) feet above the floor and six inches in width, and suitably to form a mailing. The two inside girders are 20 inches by 36 inches. The length of girders and reinforced steel were made 42 feet to allow for overlapping 12 inches on the abutment, which latter was carried up between the girders and around them to the top of the floor, so as to make a continuous wall.


No 1
PLAN
OF
CONCRETE CULVERT
OVER
PIKE CREEK
ON THE
1st CONCESSION ROAD
OF SANDWICH SOUTH, CO. ESSEX, ONT
Scale 8ft to 1inch
Owen McKay Civil Engineer
Walkerville, Ont
July 1907.
CROSS SECTION
16' 0"
9' 0"
HALF LONGITUDINAL SECTION
HALF SIDE ELEVATION
20' 0"
PLAN VIEW
40' 0"

The steel reinforcements used in these girders were two 1¼ by 3¾ and 1 in. by 3 in. Kahn Bars, 42 feet long in the outside girders, and three bars 1¼ by 3¾, and two bars 1 in. by 3 in., 42 feet long, in each of the inside girders.

The bars used in the floor were ½ in. by 1½ in. by 16 ft. 6 in., spaced 12 in. apart with ½ in. round rods placed between beams to provide against longitudinal strains.

This bridge, as well as the others referred to above, was designed to carry a 15-ton road roller, or 150 lb. live load uniformly distributed over the entire surface.

The concrete in the lower part of the abutment was composed of one part of Portland cement to six parts of gravel.

In the girders and floor, and one foot beneath, it was made of one part Portland cement to one-half part sand and four parts stone crushed to pass through a ¾-inch ring, excepting the upper 1½ inch of floor and exposed faces of beams and girders, which were faced with cement mortar in the proportions of one part cement to two parts of clean, sharp sand. The concrete was mixed by a concrete mixture, the girders, railing and back filling between and behind the girders being all completed in one day, and the floor slabs on the following day, in order that the completed bridge should conform as nearly as possible to a monolith.

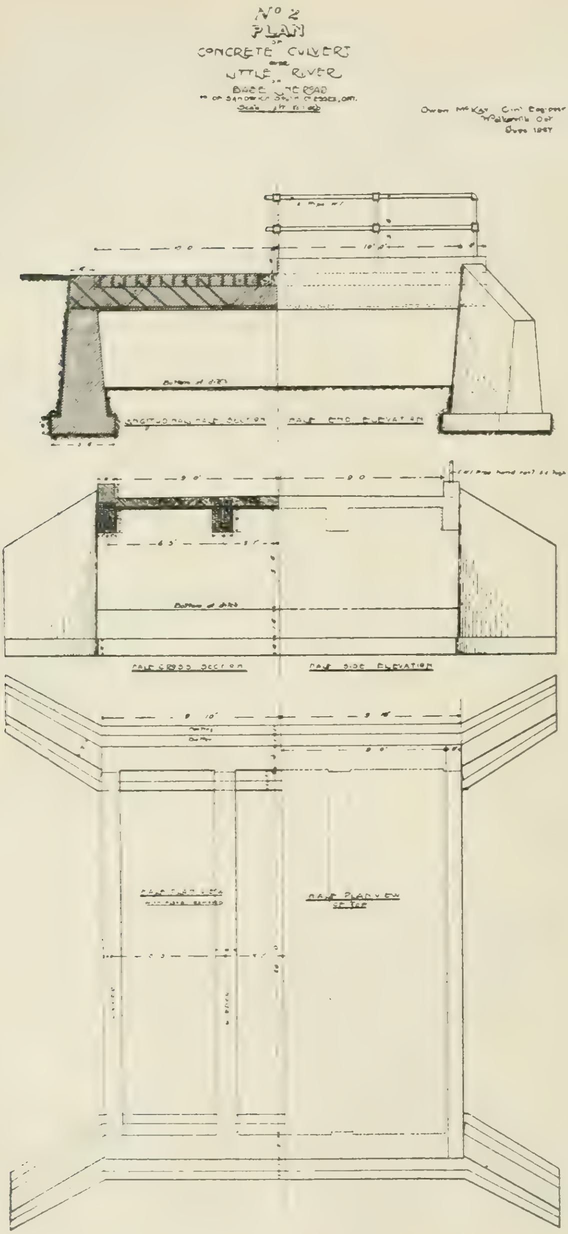
Two months after the bridge was completed it was tested by passing over it a threshing machine engine weighing nine tons, coupled to a wagon carrying a water tank weighing about three tons.

This load passed over the bridge several times, with speeds increasing from about two miles to seven miles per hour, but we could not detect the slightest deflection or vibration in the bridge, and the effect of the load was not noticeable in any way.

The cost of this bridge was as follows: Abutments and wings, 66 3-10 cubic yards of concrete masonry in abutments and wings, at $9 per cubic yard, $596.70; 41 6-10 cubic yards in floor slabs, girders and railings, at $9 per cubic yard, $374.40; 7,143 lbs. of reinforced Kahn Bars at 3½c per lb., $250; engineering, superintendence and other incidental charges, $95; total cost of bridge, $1,316.10.

The above cost includes excavation, forms, removal of old bridges, etc.

Plan No. 2.—Bridge over Little River, Sandwich South. Clear span between abutments, 20 feet; width of roadway between railings, 16 feet. This bridge was built after the same design as the Pike Creek bridge above referred to, but the girders as shown on


No 2
PLAN
OF
CONCRETE CULVERT
OVER
LITTLE RIVER
ON
BASE LINE ROAD
OF SANDWICH SOUTH CO. ESSEX, ONT.
Owen McKay Civil Engineer
Walkerville Ont
June 1907
10' 0"
Bottom of ditch
LONGITUDINAL HALF SECTION
HALF END ELEVATION
9' 0"
Bottom of ditch
HALF CROSS SECTION
HALF SIDE ELEVATION
HALF PLAN VIEW
HALF PLAN VIEW OF TOP

plan were 12 in. by 22 in. and 16 in. by 24 in. for the outer and inner girders, respectively, and the railings were composed of 8-inch copings and gas pipes.

Plan No. 3.—Bridge over Sullivan Creek. Clear span 14 feet, and a roadway 18 feet in width. This bridge has concrete abutments and a reinforced slab floor resting directly on the abutments. The slab is 10 inches thick at the centre and nine inches at the sides, and the reinforcement consists of Kahn Bars ½ in. by 1½ in. and 16 ft. spaced 9 in. centres; it is designed for a 10-ton roller or 100 lbs. per foot. The remaining flat top culvert, 10 ft. and 8 ft. spans have floors 8 in. thick at the middle and tapering to 6 in. at the sides, with smaller sized bars.

The cost of the girder bridge over Little River was as follows: 44 cubic yards of concrete in abutments, including excavation and moulds, at $7.50 per cubic yard, $330; 15 cubic yards concrete in floor and beams, at $9 per yard, $135; gas pipe railings and copings, $35; steel reinforcements, $98; cost of construction, $598; incidental costs, $70; total cost, $668.

The cost of the slab floor culverts were as follows: Culvert, 14 ft. span, $325; culvert, 10 ft. span, $267.50; culvert, 8 ft. span, $235.

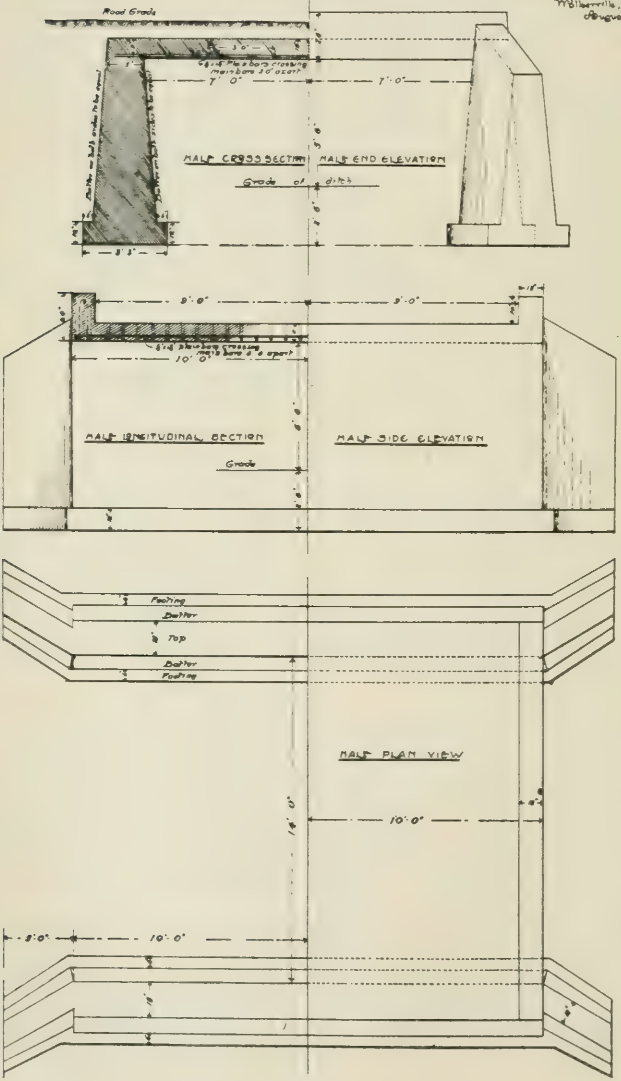
With reference to the steel reinforcements, the Trussed Concrete Steel Company of Canada, head office, Toronto, furnished the plans of floor systems for each bridge, showing all necessary details with regard to the thickness of floor, the different sizes of the bars and rods, and the spacing of the same for the specified loads the bridge was intended to carry, and the engineer has only to check over the calculations to satisfy himself that the bridge will carry the designed load with safety.

It is well known that concrete masonry has great compression strength, but is weak in tension. As the lower portion of the concrete beam is subject to tension, the steel rod or bars should be of such design as will develop the full strength of the bar without slipping in the concrete, and it must also have sheer members attached to the bars to overcome the sheer and other internal stresses in the concrete due to the external loading.

The Kahn system of reinforcement, I believe, fulfils these conditions, as the diagonals are so distributed that they resist internal stresses, prevent slipping of the bars in the concrete, are rigidly attached to the main tension bars so that no riveting or placing of bolts is required in the field, and these diagonals are not in the way

No 3
PLAN
of
CONCRETE CULVERT.
over
SULLIVAN CREEK
on
BASE LINE ROAD
Tp of SANDWICH SOUTH Co ESSEX ONT
— Scale 8 ft to 1 inch —

Owen McKay Civil Engineer.
Walkerville, Ont
August 1907.



of tamping the concrete, and can be easily put in place by ordinary labor.

However, there are numerous other bars in the market for the engineer to choose from.

As many contractors and some engineers have the impression that iron rods or bars placed near the bottom of the concrete is all that is necessary, I beg to call their attention to a paper written by Mr. L. G. Robinson, C.E., in the December number of Applied Science, published by the University of Toronto Engineering Society, in which the requirements of steel reinforcements in concrete is treated in a comprehensive and very intelligent manner.

In conclusion, I am of the opinion that steel reinforced concrete bridges will in the near future not only replace the old wooden culverts and bridges, but will come into general use in bridges up to spans of 100 feet or more owing to their relatively low cost, simple construction, adaptability to all conditions of soil and locality, and their durability.

If due care is taken in construction, these bridges will last indefinitely, with no expense for repairs.

I have attached to this paper plans of the bridges and an extract from the general specifications.

Extract from the General Specifications for Concrete Bridges in the Township of Sandwich South, County of Essex, Ontario.

All work must be done in workmanlike manner and in accordance with the plans and specifications furnished by the Township Engineer and to his entire satisfaction.

Anything omitted from the plans but which is necessary for the satisfactory completion of the work must be provided by the contractor without further charge.

The engineer shall be the sole judge of the meaning of the plans and specifications.

Excavation.—The contractor shall excavate the foundations to the depths and dimensions shown on plan and such further dimensions as will allow for the necessary curbing of the concrete work.

All masonry must be made of concrete. The floor and beams of bridge shall have the required cross-section and spacings shown on detailed plans.

The abutments and wings shall be made of concrete masonry composed of one part of American or Canadian Portland cement of approved brand, three parts of clean, sharp sand, and five parts of crushed stone. Gravel may be substituted for crushed stone in abutments, at the discretion of the engineer.

The upper one and one-half inches of floor shall consist of one part of Portland cement to two parts of clean, sharp sand, thoroughly mixed and applied before the remainder of the concrete work in floor shall have time to set.

The concrete in the body of the floor and beams shall consist of one part of cement to two parts of sand and four parts of crushed stone.

All exposed places of the bridge shall have a coating of cement mortar one inch thick, composed of one part of Portland cement to two parts of clean, sharp sand, which will be applied at the same time as the backing, and the whole rammed while fresh to insure a perfect bond.

Moulds for concrete shall be composed of two-inch plank dressed on the inner side and both edges to a uniform thickness, and shall be made stiff to prevent distortion during filling; moulds must be left on the masonry as long as may be required by the engineer.

Before laying the steel reinforcement, the forms shall be covered with a layer of cement mortar, one part of cement to three parts of fine gravel, on which the steel shall be laid as shown on detailed drawings, after which the concrete shall be immediately deposited and thoroughly tamped around to form a perfect bond.

The concrete shall be mixed in a medium wet condition.

The cement must be of the best quality of freshly ground brand of Portland cement, approved by the engineer.

Sand and gravel shall be clean, rather coarse, and free from vegetable mould or other hurtful matter, and shall be screened, if considered necessary, by the said engineer or inspector.

All broken stone must be made from clean, durable rock, and crushed so that it will pass through a two-inch ring and be rejected by 1/4-inch ring where used in abutments and wings; but the stone in floor and beams shall be broken to pass through a 3/4-inch ring. Within these limits the entire product of the crusher must be used.

The contractor must not make any alterations or changes in the work without the consent of the engineer in writing.

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CONCRETE IN MUNICIPAL BRIDGE WORK.

BY JAMES HUTCHEON, O.L.S., GUELPH.

Twenty years ago the use of Portland cement concrete was very limited in this Province. The manufacture of Portland cement in Canada was at that time still in the experimental stage. The cement then being used was imported from Europe, and being high in price, its use was confined chiefly to difficult foundation work, and to a limited extent in sidewalks and street pavements.

The use of cement concrete for sidewalk construction came rapidly into favor, because of its substantial appearance and durable qualities, compared with the materials then in use.

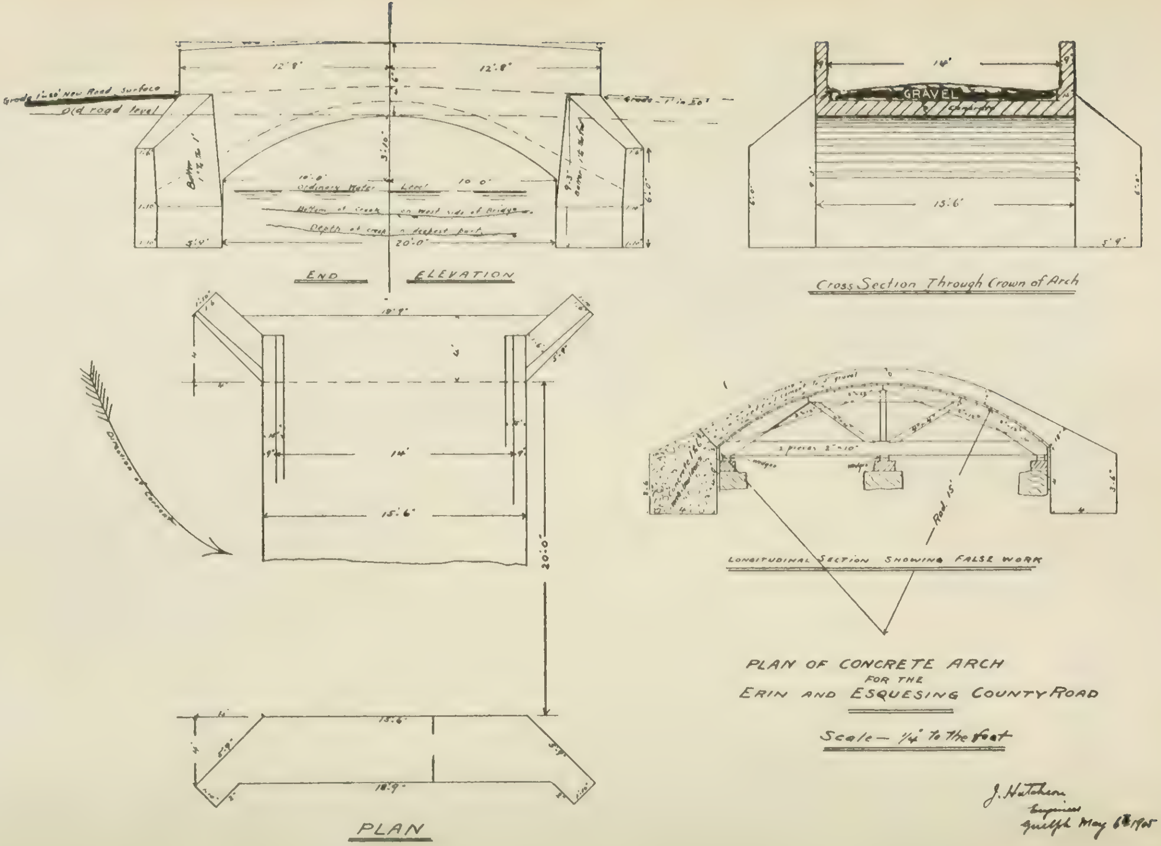
Though its value for that purpose was at once recognized, yet even ten years ago there were very few Municipal Councils who would consent to its use in bridge abutments, though some would permit it to be used in the foundations. To-day concrete has almost entirely displaced both stone and wood in the construction of abutments, short-span bridges, and culverts.

It is in almost universal use for foundations and in the basement walls of large buildings, and even in the cellar walls of low-cost buildings it occasionally takes the place of rubble masonry, while in the form of concrete blocks or of moulded artificial stone it has a recognized place among the ordinary building materials. But the widest field for expansion in the uses of concrete lies in its combination with steel in the form of reinforced concrete.

Rapid though the increase in the uses of concrete have been, the literature on the subject has kept pace with the growth, till every phase of this subject appears to be covered.

So much prominence is, however, given to the newer methods of construction with reinforced concrete, that we are apt to forget that plain concrete still has its uses, and perhaps think that if our designs do not provide for reinforcement they are not quite up to date.

The experimental knowledge of the action between steel and



PLAN OF CONCRETE ARCH
FOR THE
ERIN AND ESQUESING COUNTY ROAD

Scale — 1/4" to the foot

J. Hutcheon
Engineer
Guelph May 6th 1905

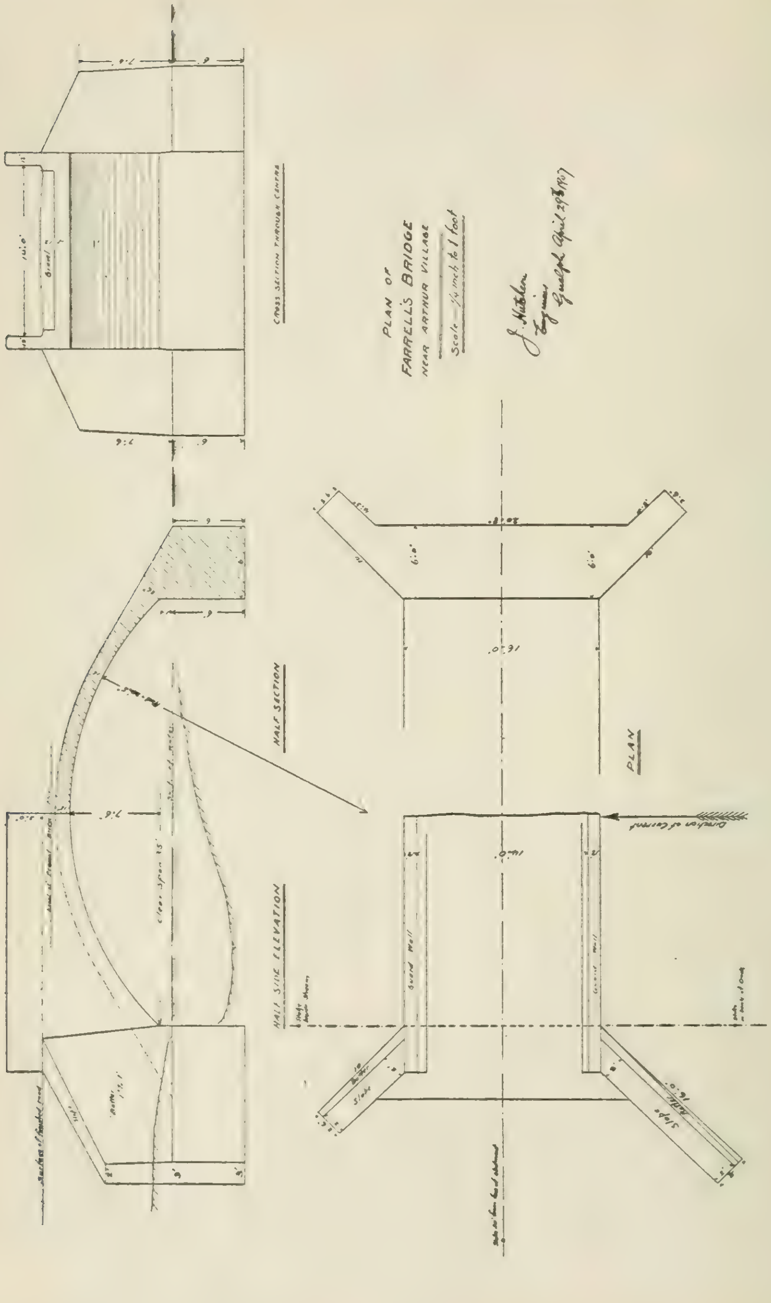
concrete is now so complete, and the experience with its use in construction so extended that its safety and durability are beyond question, when used with reasonable skill and intelligence. The want of this skill must for a time retard its use in municipal work, as the necessity for careful supervision of concrete work is not yet fully realized by the average Council.

The work, as a rule, is let to the lowest bidder, and often goes to an inexperienced contractor to be carried out, under the inspection of a Commissioner or a member of the Council without previous experience or knowledge of the work.

Limited in this way, the engineer, however much he may admire other styles of construction, will confine his designs in concrete to types within the capacity of those who are to carry out those designs. The plain concrete arch is without exception the best form of construction for culverts or short-span bridges under such conditions, and spans up to 30 or 40 feet in length can be built by local building contractors at prices which compete with steel bridges, when we take the cost of the abutments for the steel bridge into account, while the appearance and durability of the arch gives it a decided preference. The span length should be limited to something like the length named, as an increase in span much above the length mentioned necessitates more expensive false work and more difficult construction, with the increased danger of settlement during construction, so that where a greater length of bridge is required the length should be made up by increasing the number of spans rather than by increasing their length. In situations presenting no unusual difficulties in obtaining safe foundations, it will often be found that two short spans of, say, 20 feet each, can be built for less money than a single span of 40 feet, and at the same time give a bridge of more pleasing appearance. In fixing the proportions of the arch, we cannot do better than remember the old rule that the rise should not be less than one-sixth of the span, but in many cases the formation of the ground will admit of a greater rise than this, especially if the spring of the arch be kept near the low water surface.

If the arch is low and flat, its appearance will usually be improved by making it of the three-centre form, using short curves with a radius of four feet or thereabouts at the abutments.

In an arch bridge the opening or waterway may usually be considerably smaller than would be necessary for an iron bridge, and need not be much greater than the maximum flow of the stream, as even if the arch runs full, no damage is likely to result from floating ice or timber. As the wearing surface of the roadway above


PLAN OF
FARRELL'S BRIDGE
NEAR ARTHUR VILLAGE
Scale — 1/4 inch to 1 foot
J. Hutchen
Engineer
Guelph April 29th 1907
CROSS SECTION THROUGH CENTRE
HALF SECTION
HALF SIDE ELEVATION
PLAN
Direction of Current
Guard Wall
Slope
Clear Span 45'
16'0"
14'0"
20'0"
6'0"
10'0"
7'6"
9'

the arch need be only a few inches in depth at the crown, there are very few places where this form of bridge cannot be used without much change in the grade of the road.

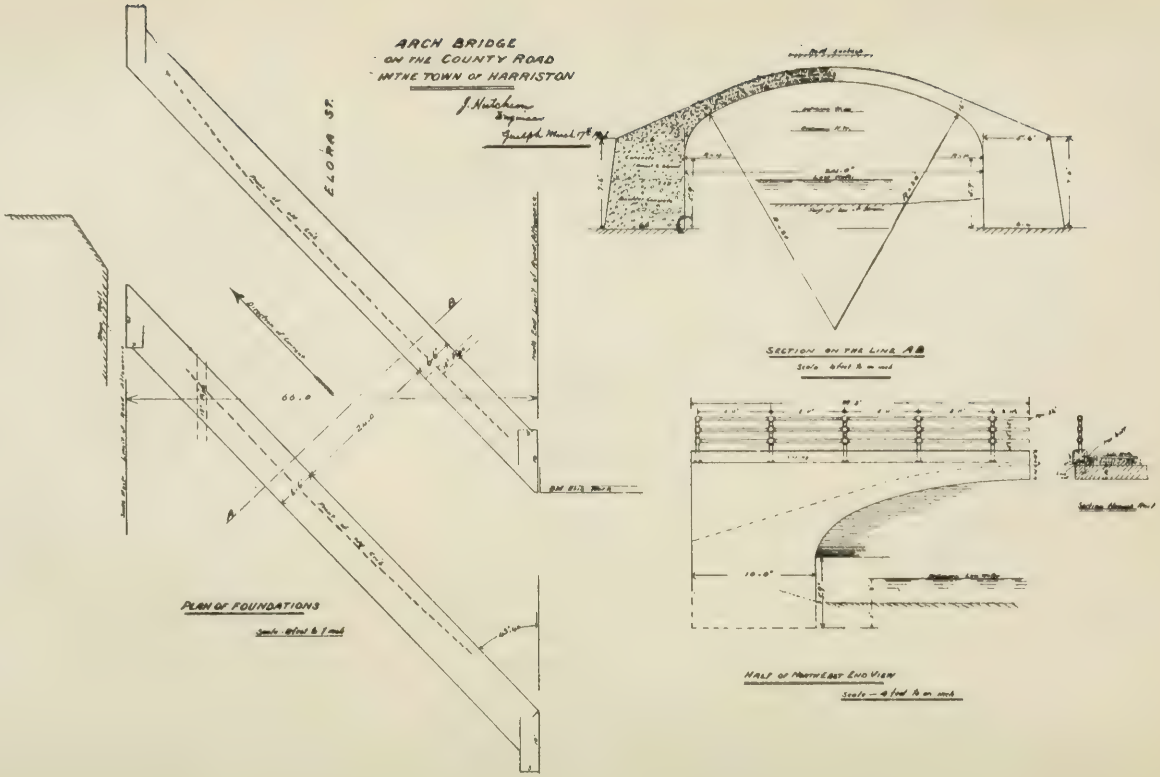
In the construction of the piers and abutments, the cost may be kept down without impairing the quality of the work by using boulder concrete. Below ground a 1 to 6 gravel concrete may have as much as fifty per cent. of the volume of the work made up of boulders. When so used the concrete should be mixed wet, so that the stones will bed themselves in it. Towards the spring of the arch the percentage of boulders should be reduced. In the arch ring a concrete of one part cement to five parts gravel has given good satisfaction.

If the gravel available for the work is fine or sandy, part of it should be replaced with broken stone. In a flat arch, a concrete of 1 cement, 2 sand and 4 broken stone is to be preferred. In the guard walls, a gravel concrete of 1 to 8 is sufficient. The thickness of the arch ring in short-span bridges is a question about which we have little available information. The writer a few years ago built a 20-foot arch, with a low rise and a thickness at the crown of 10 inches. A month after completion it carried a 15-ton roller. In several 35-foot spans the thickness has been made fifteen inches at the crown. It would therefore appear that within these span limits a thickness at the crown of one-half inch for each foot of span is safe practice for highway bridges. Whether this thickness may safely be reduced under our present methods of construction is a question for further trial.

DISCUSSION.

Mr. A. S. Code—I find very much information in this paper. I think concrete is a coming thing. Just the other day we noticed some proceedings against the Ohio Bridge ring; those men are in the "steel ring" business over there; they simply put prices up so high that it is a matter of necessity to think about concrete bridges. The sooner we get figures to show the comparative cost as to certain lengths, the better shape we will be in to meet the coming necessities.

In small bridges there is another design which would do away altogether with false work, which is a considerable item in the cost, a system of steel eye beams bent to the proper curve, and setting at the ends on the inverted channels to hold the ends in the ordinary design of bridge; then take No. 22 galvanized iron, corrugated and bent in a curved manner so as to slip in between the flanges on the


ARCH BRIDGE
ON THE COUNTY ROAD
IN THE TOWN OF HARRISTON
J. Hutcheon
Engineer
Guelph March 17th
SECTION ON THE LINE AB
HALF OF NORTH EAST END VIEW
Scale — 4 feet to an inch
PLAN OF FOUNDATIONS
ELORA ST.
Direction of Current
Concrete
Rubble Concrete
66.0
24.0
10.0"
7.6
5.6
A
B

steel beams, and thereby do away with all false work. It is found that a man can jump on No. 22 iron bent in that shape without making any impression on it at all. When those things are slipped in on the flanges it does away with all the false work and you can put the concrete right on top.

Mr. Bowman—I was much pleased to hear the paper prepared by Mr. McKay, an old schoolmate of mine; twenty-five years ago we were across the way at the School of Science together, and I have not seen him very much since then, but he has had considerable experience in engineering in the western part of the Province. I am sure this paper will be appreciated by our Association. He deals with a comparatively new method of bridge construction, and I think he gave us some good advice when he said that plans should be prepared by those competent to do so in all reinforced concrete work of any dimensions. Of course, a small culvert is a very small matter, but when it gets up to a considerable span it needs an engineer's advice who has been making this a study. Of course he suggests that the companies will supply plans—the companies that make the reinforcing material—but you are rather at the mercy of the company if you resort to them, so that there is a field for engineers that make a specialty of reinforced concrete work. I see Mr. Connor has just come in, and that happens to be his line, and if any of our surveying friends have any reinforced concrete problems that they have to solve there are engineers in the field who will help them out without resorting to the companies. In that way they can get what Mr. Code seems to be anxious to have, a good competition in engineering work, and that is very much to be desired, so as not to be at the mercy of any contractor in any particular line. Reinforced concrete is bound in the future to compete with steel bridges where the foundations and the situations are suitable. Of course the steel bridge still has its field, but reinforced concrete will take a great deal of the work that heretofore went to the steel bridge companies.

Mr. McMullen—Mr. President, I noticed that Mr. Hutcheon's paper differed rather materially from the paper I have just read written by Mr. McKay, in the fact that Mr. McKay speaks of reinforced concrete almost entirely, while Mr. Hutcheon seems to be quite satisfied with the old style of non-reinforced concrete. Probably Mr. Hutcheon has some very good reason for building his 30 and 40-foot span bridges in that way; it may be more economical. Perhaps Mr. Hutcheon can tell us why he prefers the concrete not reinforced for his 30 and 40-foot span bridges.

Mr. Hutcheon—In my paper I refer to the method of carrying out the work. Municipal Councils in our part of the country do not want to pay an engineer very much for supervising the construction; they get a plan and they want all that is in it, as a rule. A commissioner is generally appointed, the inspector and the engineer see the work under construction, or perhaps they do not; so that reinforced concrete cannot be carried out very satisfactorily under those conditions. Again, I think the plain concrete has the necessary strength and is probably cheaper.

Mr. McMullen—You figure then that the price of the extra concrete would pay for the extra superintendence that would be necessary for reinforced concrete?

Mr. Hutcheon—Yes. I don't know that I can compare costs with the costs given in the other paper. There is a ten-foot span which was built by the County of Wellington with guard and swing walls; it was built complete for $210 a year ago.

Mr. McMullen—Mr. McKay gives $267 for a ten-foot span culvert.

Mr. Hutcheon—There are other spans. Here is one built up near the Village of Hillsburg, but I haven't the price marked on it.

Mr. McMullen—I presume these would be about 16 feet long.

Mr. Hutcheon—Fourteen feet to your roadway—14 feet and then the wing walls—about 18 feet over all. Here is a blue print of one built in 1905, and the reported cost is $1,900. That is a 35-foot span. The main cost in that was the foundations. The foundations are ten feet below the spring of the arch.

Mr. McMullen—You didn't pile in that case?

Mr. Hutcheon—No. Here is another one built about a couple of hundred yards from the other, with about the same span, and with a flatter arch; and the contract price of that, let a year ago, was $1,056. It was all done by contract.

The President—We are very much indebted to Mr. Hutcheon for this explanation, and if there are any other gentlemen who wish to speak on these papers, we wish to give them an opportunity. Mr. Warren was very much interested in this matter; perhaps he will have something to say.

Mr. Warren—Mr. President and Gentlemen, I certainly appreciate these papers very much. There is some very good technical information given, and we ought to appreciate it very much, because these papers are given by members of our Association. We get the most of this concrete information, or a great deal of it, from the States; we get some good things from there, but when we get it from our own country and our own men we ought to appreciate it the more. There is a paper called "Municipal Engineering," published in New York, and it gives a great deal of information regarding these things, practically on the same lines as given by Mr. Hutcheon and Mr. McKay in their papers, and we ought to be preparing ourselves for this concrete, because it is a coming article for building which we want to have in our country; it is going to supersede the steel for small culverts. Of course in our large spans of 100 feet or over they will build them of steel. I saw the plan of a bridge yesterday in the Public Works office, 90 odd feet of concrete, which is a very massive structure. There is no bridge that has a finer appearance than a cement or stone arch. I certainly appreciate these papers very much, and I thank the members for having given them to the Association.

Mr. Bowman—At the risk of being a little lengthy in my remarks, I would like to say one or two things on some of these plans. Surveyors, I think—I include myself as a surveyor—are apt to take anything they see in our Proceedings as something they can bank upon. There is just one little note of warning about some of these plans we may have reproduced, and that is, that the situation will have to be studied before they can be duplicated. The County of Wellington, which Mr. Hutcheon comes from, is pretty generally founded on the rock, and Mr. Hutcheon's plans no doubt have stood the test, or else he would not bring them here some years afterwards and show them to us; but if we are to take light concrete arches, similar to his plans, and put them on a foundation of quicksand or something equally unstable, we will probably find some fine morning they will be in the bottom of the creek. I don't think that would be quite as apt to happen with reinforced concrete, because the bars would permit of settlement to a certain extent; although they might be cracked, they would still remain in working order. In that way I think that reinforced concrete is considerably safer. In Mr. McKay's plan there is just one feature, looking at that for a few minutes, that I noticed, that I think there can be an improvement in, and that is in the concrete abutments. He says the abutments are not reinforced. The feature that I noticed was that he has a batter from both the back and front of these abutments. He tapers that up from the width he has taken from the bottom to a much narrower width at the top, and he puts a batter on both back and front. I believe that it is a mathematical mistake to batter the back. If any of you have seen Theodore Cooper's specifications for bridge abutments, you will have noticed that he has the back plumb; but in order to get the same width at the top, he steps them in, and in that way, instead of having the back battered and the force applied so that it will push your abutment into the creek, you have the force applied horizontally; those steps help to keep the abutment erect instead of there being a tendency to push them over. I believe they are easier constructed if the contractor understands how to do so, with those horizontal steps at the back and have the back plumb, and then the weight down on those steps will keep your abutment up to a certain extent and there is no tendency to push them over. With the battered back there is the tendency to push them over.

Mr. Hutcheon—I may say in reference to the concrete plans I have submitted, that none of them are built on rock foundations. I don't know that I have ever built an arched span on a rock foundation. Those 35-foot spans are built on clay foundations.

Mr. Bowman—A good solid foundation?

Mr. Hutcheon—Good firm clay. In the paper I refer to a 20-foot span which I built and put a roller over a month afterwards, or perhaps less than a month; that was built in the City of Guelph. We had a road which was pretty low and we couldn't raise it, and I put in two 20-foot arches there and the double arch cost us about $1,250. We had a good deal of difficulty with the foundations on that case; we had to keep a steam pump going all the time while we were putting in the foundation; I think we had a 16-foot roadway in that case, and about a four-foot cement sidewalk and concrete guard walls. The cost was lower than any of these I have submitted. It was done by day work. I hadn't a plan of it; I just made a pencil sketch; but it was a very flat arch.

Mr. Warren—Wouldn't an abutment battered on the back be more likely to stand a back thrust than one built with steps?

Mr. Bowman—Well, perhaps I can illustrate that better with chalk. (Makes rough diagram.) Take that as an illustration of the abutment with a little batter on the front; and then to get the necessary reduction in width they put considerable batter on the back. It seems to me the pressure of earth tends to push that over. Whereas, if you step it off in the back you have an abutment that the pressure of the earth tends to keep erect; and that is the method that Theodore Cooper has adopted altogether in his bridge abutments, and I think it is, mathematically, a better proposition than the other.

Mr. McMullen—Don't you think the element of friction there is the important feature of the step?

Mr. Bowman—You have the weight there.

Mr. McMullen—There is more friction against the earth bank with the steps than there would be with a battered abutment?

Mr. Bowman—I have not worked it out mathematically.

Mr. Ure—Mr. Bowman's criticism does not apply to bridges such as Mr. McKay's plans show. There are heavy, massive concrete beams between abutments which would make it impossible for pressure from behind to have any effect in the way of pushing them into the creek. That method is all right for steel bridges, but does not apply, I think, to such bridges as Mr. McKay has designed.

Then there is another thing that Mr. Code mentioned I would like to call attention to, that is doing away with false work by building concrete bridges with eye-beams and using corrugated iron slipped in between the flanges. I think that is a mistake. The bridge companies that furnish eye-beams and corrugated iron recommend that, but they are not interested in concrete bridges, they are interested in steel bridges. They are interested in selling steel, that is all. In the concrete bridge, if there is steel in it at all, I think the steel should be entirely embedded in concrete. If it is exposed at all, as this would be exposed—the under side of it would be exposed to moisture; it is never painted or looked after until it falls down—the rust is continually eating its way from the bottom upwards; and you will find it makes a very much stronger bridge, and you can use less steel if you build the concrete with the eye-beam embedded in it, with probably about two inches of concrete below the steel, and then build your floor on top of that.

There is another thing that we should be on our guard against, and that is the adopting of the plans furnished us by trust concrete and steel companies, and other companies who are interested in steel, and putting those plans into the hands of inexperienced men to build. It looks to be a very simple matter to place the steel according to those plans, but it is a very important matter that the steel should be properly placed, and placed by men who understand the reasons for placing it where it is; also very important that the concrete should be mixed in such a way that it will have a perfect bond with the steel. I have had some experience with that where inexperienced men would place probably inferior concrete, or concrete that was too dry—placing the steel carelessly and mixing the concrete carelessly and too dry, so that the steel didn't hold in the concrete, and the result is, no matter how well the plans may be drawn, if the work is not carried out with accuracy and with some knowledge on the part of the overseer, failure will follow. Don't trust too much to the plans, but see that the plans are accurately carried out. If they are not the result will be a failure.

Mr. S. James—Unfortunately for me my hearing is not very good and I am not able to follow all that has been said. However, I can recognize a little of what has been said, and I would say this, with reference to those abutments, that that kind of work, whether it be concrete, brick or stone, or wood, or whatever it may be, I think there is too little attention paid to it by the parties constructing the bridge; whether the engineer omits to be present himself when the work is being proceeded with or not, I don't know, but this much I must say, that there has been, as a general rule, too little attention paid to the filling in of the earth behind the abutment. Very often the contractor, or whoever he is who is doing the work, is permitted to dump from a cart from the highway itself towards the abutment, just continuing that right up to the abutment without any regard to ramming in or levelling down. Now that is the greatest mistake possible. There is a large amount of strain that is lost by simply that process. The abutment may be as strong as you like, still there will be more or less pressure if it is allowed to be done in that way. That is my experience, and I have had some little, though not a very great deal.

Now I think in the construction of a bridge or culvert it is very important that the filling should be done properly, and that the engineer should give instructions to some one, if he is not present himself, to see that that is done, and that the levelling is proceeded with horizontally, or if anything, rather higher towards the abutment, than back from it, and kept that way right along up until the filling is complete. That is my opinion of the matter. I don't know how the other gentlemen may look upon it, but I certainly think that this is a very important feature in building abutments for bridges of that kind.

The President—These papers are very interesting to the profession, and the discussion is very valuable. I will gladly give an opportunity for anyone else to give us some information.

Mr. Connor—I think there is no doubt for the shorter span culverts that probably non-reinforced concrete may be all right, but where you get longer spans it would be quite impossible to rely on them, because if you get an eccentricity of load it will produce such severe strains in the bottom or top of your arch that the concrete cannot be depended upon to carry it. It is my opinion, too, that concrete bridges should be as carefully designed, and stresses and everything calculated, just the same as if they were steel structures, because, although they may stand a certain time, you may get some day a condition of loading that will affect it, or it may stand the load a good many times and yet the last time it may go, through the gradual cracking of the concrete. The insurance against that is the use of steel. While I quite agree with the previous speakers that it should be very carefully placed, I would hardly think that the extra supervision required would offset the loss in strength by the omitting of the steel. It is possible to place steel without going into it so very carefully, and yet accomplish a great deal, and strengthen the structure very materially by the introduction of plain bars.

There is another little point which was mentioned and that is reinforcement of steel beams. I think that is uneconomical in every way, unless the beam was so shallow and the depth of the concrete so great that the steel is all kept down well below the neutral axis. In fact, the efficiency of the steel is directly in proportion to its distance from the neutral axis. Any steel you have near the neutral axis amounts to absolutely nothing. So that the steel, in order to be economical, should be kept as near the bottom of the slab as possible.

Mr. Hutcheon—In concrete steel beams I think the tendency is to have the reinforcement built in a factory so that it can be placed or held in place while the concrete is being put in. I think that the tendency in building beams now, instead of trusting to the inspector to see it is in place, is to have it fastened in place.

Mr. Connor—To a certain extent. It applies more, I think, to the slabs where they manufacture a fabric of the required strength that is simply placed and rolled out in position, but it cannot be done to the same extent in beams. The reinforcement is often built on the ground and that requires a certain amount of care. The Kahn bar in a measure satisfies that requirement, the flange, and so on, being ready and made to the proper size.

The President—I don't like to shut off discussion of such interesting papers as these, and if anyone else has anything he wishes to say we would give him a few moments, but time is passing, and we will have the benefit of the papers and the discussion in our Annual Report.

[*This Association is not responsible, as a body, for the opinions expressed in its Papers by Authors.*]

RIGHTS OF WAY.

BY WILLIAM ERNEST M'MULLEN, ST. JOHN, N.B.

In the year 1848 the first sod of the St. Andrews & Quebec Railway was turned, and after many vicissitudes the railway was opened for business about the year 1857. This was the first railway in New Brunswick, and, as its name implies, was projected to connect, for military as well as commercial purposes, the seaport of St. Andrews with the ancient City of Quebec. Perhaps those who encouraged the construction of this railway from a military standpoint had in mind the memorable march of the 104th Regiment on snowshoes during the winter of 1813-4, when they traversed the wilderness between Fredericton and Quebec in order to assist the Upper Canadian troops in defending the frontier. This St. Andrews & Quebec Railway was the nucleus of the Canadian Pacific system in New Brunswick. It never reached Quebec. In fact, for a number of years the northern terminus of the road was not far from the town of Woodstock, N.B., and subsequently became the New Brunswick & Canada Railway, which eventually consisted of a line between St. Andrews and Woodstock, a branch to St. Stephen, another eight miles long to Houlton, Maine, and another six miles long to Vanceboro, on the border. In the meantime other railways were being constructed in New Brunswick. A road from St. John into the State of Maine, under the elaborate title of "The European & North American Railway for Extension from St. John Westward," was opened in 1867. This road went into the hands of a receiver and afterwards became the St. John & Maine Railway. The Fredericton Branch Railway, a 22-mile line, was built in the late sixties between the City of Fredericton and the St. John main line. This line was operated until 1883 as a distinct railway, when it was taken over by the New Brunswick Railway. The latter was a line first constructed from Gibson, opposite Fredericton, to Aroostook County, Maine, eventually being continued to Presque Isle, Maine, and extended into Woodstock and north to Edmunston. In 1882 the New Brunswick Railway acquired the New Brunswick & Canada, and in 1883 the St. John &

Maine, and the Fredericton Branch. After operating these lines until 1887, the New Brunswick Railway Company leased them to the Canadian Pacific for a thousand years, less one. At the time when most of these lines were being located there was a railway hunger in the land. The land itself was worth so little without a railway that owners in many cases freely gave the right of way. In other cases the right to traverse properties with the railway track was verbally given, and in many cases at the present time, unless adverse possession can be shown, the right of way does not appear to extend beyond the ends of the sleepers. Some deeds of the right of way were obtained, but on most of the branch lines it seemed to be the exception rather than the rule when title was obtained in this way. On the Western Extension, however, as the St. John Main Line was commonly called, deeds were generally had when the line passed through settled territory, and after a lapse of about forty years, the writer, in making a right of way survey on these lines, was called upon to make their acquaintance. When the Canadian Pacific acquired the New Brunswick Railway System there were practically no reliable track or right of way data, such as profiles or plans showing railway lands and alignment. In the old days they seemed to scrape along without these things, but conditions are very different now. Competition is keen, and railways to be successful must be handled systematically in all their various departments. A railway spends money for power and looks for it again in haulage tolls. The expenditure of power depends upon grades, curves, distance, and physical condition of roadbed, so that where these items can be improved it will mean less power in proportion to the tonnage, and consequently more profits. It will be seen that in order to know exactly where we are in the matter of grades and alignment, and where we would be as regards right of way, etc., in the event of any changes, a survey to obtain such information was very necessary. Not only this, but in connection with maintenance work, information is being continually asked for which involves much time and many special trips unless it is properly compiled after a comprehensive survey. It was conditions such as these that recently called for a re-survey of New Brunswick lines. The general scheme of the survey was to make a centre line traverse and tie in, right of way fences, lot lines, parish and county boundaries, locate the properties of the various owners along the line, run rail levels, obtain approximately the original ground line, and note the dimensions of culverts, etc. Such a survey in New Brunswick involved many more difficulties than would be found in a similar survey in probably any of the Provinces to the west. There was never any comprehensive system of survey adopted by the Government.

The Province began to be settled after the British occupation of Canada in 1760, and twenty-three years later the few settlers already here were largely augmented by the arrival of the Loyalists from the revolted colonies. The Loyalists received land grants principally along the St. John River, and from that time to the present land obtained from the Crown has been in the form of grants of any convenient size and shape, being a subdivision of nothing but simply so much land surveyed and cut of the wilderness. Sometimes, of course, these grants consisted of very large blocks, which were subdivided into lots. For example, the soldiers who served in the 1812-14 campaign were granted land which was allotted to them in tiers of uniform lots, and occasionally a certain man and associates would be granted a large parcel, which would be divided into lots for the several grantees. But there are no such things as base lines and subdivisions as generally understood in the newer Provinces. Practically all lines, long or short, were run by the needle, and as might be expected, the compass is the universal instrument used for their re-survey. The nature and extent of my survey did not, as I am sure you will understand, warrant the spending of much time in tracing out lot lines, nevertheless in some cases where limits of the right of way and the proper tying in of my work depended upon determining them, I went to some trouble in doing so. Where party lines were marked by fences, and these checked with the lines on the original Crown Lands plans, they were usually accepted as the best evidence of the location of those lines. In a number of cases there were no fences, but original lines re-surveyed had been marked by blazes, and very frequently there was no trace whatever of an existing line. While the "Act" is silent as to method of re-survey, in laying down these lots upon paper, I adopted what I believed the only reasonable one of proportioning surplus or deficiency between known lines and running them on the course intended in the original survey as nearly as this could be determined. Sometimes this direction could be obtained from a line in the vicinity, which had been run in the original survey, but more often it was laid down from the astronomical course after allowing for the declination of the needle and the annual variation. The former, at present in the vicinity of St. John, is about 20° 30′ west, and the latter, until within the last few years, was considered to be about 3′ per annum. At present the declination appears to be at its maximum, for there is no appreciable annual change.

The system of conveyancing in vogue in this Province gave me no little trouble in locating those portions of the right of way for which there were deeds. I do not know of one case in which these properties were located and described with reference to the lines of an original grant. Rarely the parcels were described by metes and bounds, but very frequently the description was similar to the following:

Conveyance from James Jones to the E. & N. A. Railway Co.

All and singular that certain lot, piece and parcel of land situate, lying and being in the parish of Petersville, in the County of Queens and Province of New Brunswick, and described as follows:

Bounded on the north-westerly side by the lands of one James Belyea, on the south-easterly side by the lands of one Thomas Trott, on the north-easterly side by the lands of the said James Jones, and on the south-westerly side by the lands of the said James Jones, the same being a piece of land ninety-nine feet in width, running in a north-westerly and south-easterly direction, the same being a part of the farm now occupied by James Jones and his wife Margaret, and along, across and over which the said the European & North American Railway Company for extension from St. John westward are now building and laying, or intend to build and lay, the railway of the said company, which is to extend from the City of St. John westward to the eastern boundary of the State of Maine.

The difficulties attendant upon the location of this property forty years after the description was written are too apparent to require further explanation. I usually looked up some aged resident who was familiar with the property owners in the locality at that time, or failing in this, I would then go to the Registry Office and endeavor to find a record of the grantor's deed. Quite likely the description here would be similar to the one in question in referring to contiguous owners for the bounds. Then the deeds of these owners would be referred to if they could be found. Sometimes people did not bother recording their deeds, and this would add to the difficulty. But in almost every case by enquiry or search the property was located. In the Registry Offices all conveyances are recorded under the names of Grantor and Grantees in alphabetical order. This is the only way in which they are recorded, there being no reference whatever to the original lot or grant, so that you would find the conveyance of John Smith's land in one parish indexed with John Smith's land in another. Registered plans would often have been of assistance in my survey, but these are remarkable by their absence. In the Registry Office for the City and County of St. John, where they have continuous records for the last 120 years, there are about 100 plans. In a couple of other Registry Offices that have been in existence from 80 to 100 years, I could carry all the plans of both offices very comfortably under my arm. I think some of the finest people in Canada live in New Brunswick, but I wish some of the good old-timers had provided a little different system of surveys and records.

For the field work two box cars were fitted up. The one with bunks and a drawing table, and the other with a dining table, stove, and quarters for the cook. The party, besides myself, was composed of a transitman and two picketmen, a draughtsman, a leveller and rodman, and three chainmen who went ahead and paint-marked one rail every hundred feet. These last could cover eight or nine miles a day without much trouble, and after getting their work well ahead of the party, were recalled to locate right of way, fences, culverts, etc. The leveller would cover about four and a half miles per day, and when he got too far ahead of the transit was recalled and ran a spare transit for a while. The transitman was paid $75 per month and draughtsman the same; leveller, $60, and the others, most of them engineering students, $1.35 per day. The cook got $40 per month. The average progress of the field work was a little over two miles a day, and the average cost of the field work, exclusive of car furnishings and inclusive of wages and board, was $14 per mile. The cost of fitting up the cars with stoves, bunks, blankets, mattresses, tables, dishes, etc., amounted to about $150. I was unable to obtain a draughtsman when the party first started out, and when I did he was never able to overtake the field work. This was the source of more or less trouble, and in prosecuting work of this kind again I would see to it that the drawing went along with the transit work, even if the plan had to be started in the middle of the survey. I found also that what seems easy and matter of course to a man who has seen a great deal of service in the field, is not always so apparent to an engineering student. These young men are excellent in many ways, and much the better men for their training so far as it has gone, but we sometimes forget that they are yet schoolboys, and look too soon for ripened fruit.

In commencing the track traverse the instrument was plumbed over the zero of the chainage with the telescope directed to the pole. Readings were then taken to each hundred-foot station in succession, and finally to the foresight or turning point. These turns on curves were usually taken about every 500 feet, and from end to end of tangents. The following is the manner of entering the notes in the field books:

Station	B. S.	I. S.	F. S.	Course	Remarks
2324 + 50.5	2320 + 09.3			S. 6° 14′ E.	
		2325 + 00		N. 5° 10′ W.	
		26 + 00		N. 2° 15′ W.	
		27 + 00		N. 0° 32′ E.	
		28 + 00		N. 3° 25′ E.	
			29 + 00	N. 6° 30′ E.	
2329 + 00	2324 + 50.5			S. 6° 30′ W.	

Observations for meridian were taken usually at intervals of two to five miles. Most of these were solar, but a number were also taken of the Pole star. The method adopted in observing the sun was as follows: The transit was set at one end of a tangent and sighted to a station at the other, the horizontal limb reading zero. The telescope having previously been levelled, and the index error (if any) noted, it is now directed towards the sun's easterly and lower limb if it be forenoon, or the easterly and upper limb if it be afternoon. After reading both horizontal and vertical limbs, the vertical arc and the lower horizontal plate are set free, the telescope plunged and revolved horizontally 180 degrees, and the first operation repeated. The following is the field book entry and record of the calculation. Latitude and longitude were obtained by scaling from an eight mile to the inch map.

FIELD NOTES

HOULTON BRANCH JULY 13TH, 1907

Obs.	Atlan. Std. Time	Limbs	Horizontal	Vertical	Station to Station	
A.	3.14 P.	U. E.	159° 14′ R.	49° 59′	41	50
B.	3.21 P.	U. E.	320° 18′ 30″ – A.	48° 59′		

CALCULATION

21° 56′ 31″ = Decln. at Noon
0° 00′ 54″ = Corr. for time of obs.

21 55 37 Decln. at time of obs.
(a) 68 4 23 Polar distance.

49° 59′ 00″ = Obs. alt.
49 Refrn.

49° 58′ 11″
6 Parallax

Formula

$$\cos.\tfrac{1}{2}A = \sqrt{\frac{\sin\tfrac{1}{2}s.\sin(\tfrac{1}{2}s - a)}{\sin b \ \sin c}}$$

49° 58′ 17″
15 46 Semi. dia.

49° 42′ 31″
(b) 40 17 29 = Co-alt. or Z. dist.

46° 4′ 30″ = Lat.
(c) 43° 55′ 30″ = Co. Lat.

(a) 68° 4′ 23″
(b) Sin 40° 17′ 29″ = 9.810686
(c) " 43° 55′ 30″ = 9.841181

152° 17′ 22″ 9.651867

Sin 76 8 41 = 9.987175
68 4 23

Sin 8° 4′ 18″ = 9.147403

9.134578
9.651867

9.482711
9.741355 = Cos. 56° 32′ 48″

56° 32′ 48″ doubled = 113° 5′ 36″
Horizontal angle = 159° 14′
Semi dia. = 15′ 46″

N. 272° 35′ 22″ E.
A. = N. 87 24 38 W.
B. = N. 87 25 38 W.
Mean N. 87° 25′ 8″ W.

The above is not written for the benefit of the past masters present, but solely for the apprentices. It will be noticed that the calculation is not elaborate, and the work of observing is not troublesome when one has acquired the habit. The writer suggests a method similar to the one described as being exceedingly useful as a check in traverses of any considerable extent. It is hardly necessary to say that observations within an hour of noon are not satisfactory. With the transit carefully packed on a track velocipede, a man unaided can take a number of observations over, say, 20 miles within a day. The velocipede was also used for a number of observations taken at night, many of them taken without any assistance. A still night should be selected if possible, and the velocipede loaded with the transit, a small lantern with a reflector in it, and a few candles. It is better to have an assistant hold the lantern for you, but if necessary he can be dispensed with. Coming to the beginning of a tangent, a candle is lighted and set on the rail, then proceeding to the far end of the tangent the transit is plumbed over the rail and sighted to the lighted candle. No care was taken to observe the star at any particular time, such as at the elongation. With an ordinary watch and the ample means along a railway of checking it, there is no difficulty in reading the time of an observation to a half minute, and the greatest error which can occur through the noting of the time is at the rate of half a minute of arc per minute of time, and becoming less the more distant the star is from the meridian.

The following are the field notes and calculation in connection with an observation of the Pole star:

Obs. Polaris June 11-12, 1907, between Welsford and Grand Bay.

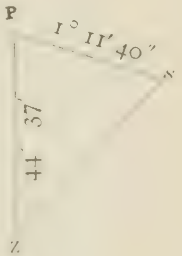
	Mean Std.	Defln.	Lat.	Location.
1.	8.57 p.m. 9.00 p.m.	58° 4′R 58° 6′R	45° 25′	Tan E. of Bayard.
2.	9.54½ 9.59	24° 44′ R 24° 42½′R	45° 23′	Blagdon.

CALCULATION.—OBS. NO. 2.

$9^h\ 56^m\ 45^s$ mean of obs. times
— 25 30 difference between 60th Mer. and M. S. T.

9 31 15 mean time of obs.
8 8 29 transit of Polaris M. S. T.

1 22 46
$82^m\ 46^s \div 4 = 20°\ 41'\ 30'' = P$
$\frac{1}{2}P = 10°\ 20'\ 45''$



Cos 21° 42′ 40″ = 9.968044
Cos 22 54 20 = 9.964329

0.003715
Cot 10 20 45 = 10.738601

10.742316 = tan 79° 44′ 30″

$$\begin{array}{lrrrcl}
\text{Sin} & 21^\circ & 42' & 40'' & = & 9.568010 \\
\text{Sin} & 22 & 54 & 20 & = & \underline{9.590188} \\
 & & & & & 9.977822 \\
\text{Cot} & 10 & 20 & 45 & = & \underline{10.738601} \\
 & & & & & 10.716423 = \tan \underline{79^\circ\ 7'\ 30''} \\
 & & & & & \qquad\qquad\qquad 37'
\end{array}$$

$$\begin{array}{rrrl}
24^\circ & 43' & 15'' & \text{mean defln.} \\
 & \underline{37'} & & \\
\text{N. } 24^\circ & 6' & 15'' & \text{W.}
\end{array}$$

$$\begin{array}{rrrl}
44^\circ & 37' & & = \text{co-lat} \\
+\ 1^\circ & 11' & 40 & \\
\hline
45 & 48 & 40 & \\
22 & 54 & 20 & \\
44^\circ & 37' & & \\
-\ 1 & 11 & 40 & \\
\hline
43 & 25 & 20 & \\
21 & 42 & 40 &
\end{array}$$

Formula

$$\tan \tfrac{1}{2}(s+z) = \frac{\cot \frac{1}{2} P \cos \frac{1}{2}(a-b)}{\cos \frac{1}{2}(a+b)}$$

$$\tan \tfrac{1}{2}(s-z) = \frac{\cot \frac{1}{2} P \sin \frac{1}{2}(a-b)}{\sin \frac{1}{2}(a+b)}$$

The method of plotting by tangents was adopted and proved satisfactory as regards accuracy and speed. Many favor using latitudes and departures, and certainly there is no better method as regards accuracy, but I do not consider it quite so speedy as the former. In using latitudes and departures with odd distances it will be best to use tables of logarithms and logarithmic cosines and sines. I find these tables preferable to ordinary latitude and departure tables even when the latter are taken out to minutes. The matter of obtaining the degree of curvature B.C. and E.C. is an office job, and often a tedious one, becoming very complicated in the cases of compound and reverse curves. Where the curves were short, however, and the P.I. fell within the right of way, they were run to intersection and the external measured. By reference to a table of the elements of a one-degree curve the curvature and tangent distances can be at once obtained with very few figures.

In conclusion, I would say that my little party were very comfortable in their house on wheels, and so far as the table was concerned, we lacked none of the ordinary requirements of civilized man. I contrast our favorable circumstances in these respects with my memory of the first bush survey—not an unpleasant memory by any means—in which we had to carry everything on the outside before we could wear it within us. A little incident in the matter of obtaining provisions, which may be of value to members of the profession and others, concludes this paper. Fresh beef and mutton was to be had without difficulty, but after a time certain members of the party sighed for a change, and looked with covetous eyes upon the hens which gathered their food beside our cars. Negotiations were opened with their owner without success, the hens were laying and were not for sale. When evening came the river was tried for fish, with no luck, and in a moment of abstraction, or something else, the fisherman left his baited line hanging out of the car window. The rest of the circumstances are very sad—for the parties concerned—but it is necessary to relate them in order to complete the story. The worm—and incidentally the hook—was swallowed by a thoughtless hen. Now, the men of the party were humane if anything, and after a brief consultation it was decided that an operation for the alienation of the hook must be performed in order to relieve the unfortunate fowl of that indigestible barb. The decision was carried into effect without delay, the principal instrument in the surgical operation being the ubiquitous survey axe. Unfortunately, from the standpoint of the hen, the operation was not a success, and she lost the number of her mess. Next day at noon she was accorded a decent, and, for a hen, a very fitting burial, at which most of the party were present and took an active part.

Discussion.

Mr. D. D. James—I did not quite understand Mr. McMullen's explanation as to the method he followed in the reading of the instrument.

Mr. McMullen—The instrument is set at 24, for brief, and back-sighted at station 20. I find the course to be south 6 degrees, 14 minutes east, astronomically; my telescope is revolved and I sight the next station from it; the reading of the instrument is north 5 degrees, ten minutes west. My instrument is always reading the astronomical course. I find that to start with and I set the graduation of my instrument to read that course. When I am on the course north 5 degrees, ten minutes west, my instrument is reading 5 degrees, 10 minutes to the left.

Mr. James—How is the instrument graduated?

Mr. McMullen—From zero around to 180 degrees; but I don't think you would have any trouble operating that, no matter what the graduation was. It is exceedingly useful, because your instrument is always on the astronomical course, and it is very handy in plotting.

Mr. James—I find in reading the astronomical course or compass course that when one gets a course near 90°, say 85°, and gets another course 85°, altering the direction from east to west, or south-east to south-west, you are very likely to book that south-east, too, not noticing the change from the direction east to west, and in consequence of that I like to have a compass graduate from 0 to 360, and simply read all my courses on the instrument from it; and if I want to have north-east and south-west afterwards, I can convert them, otherwise I have the continuous reading. Whenever the letters are mixed, personally I make mistakes that way.

Mr. McMullen—That is a thing one must be careful about. There is danger of making an error, but where the courses are put down in this way, running no greater than 90° it is much more convenient for plotting.

Mr. James—That is the tangent method—plotting by the tangent of the angle?

Mr. McMullen—Yes. I might have 20 or 30 courses I would like to lay off, I would establish a long meridian and then take a base of 10 inches or any multiple of ten, then take my table of natural tangents and lay off all these various tangents, and then by joining these parts of the lines which are parallel to my courses it is an exceedingly quick method of plotting, and very accurate.

Mr. James—I may say I have done quite a bit of right of way work on a plan of that sort, and with the money and time that are usually at the disposal of a person in that situation, I have found that plotting the course with a large protractor suggests itself to me as the easiest way; and for the accuracy of it completely within bounds, the way I like best is to draw a straight line from end to end of the roll of tracing cloth and lay a protractor on there, one of these 14 inch protractors, having it distinctly marked for the degrees on itself in Indian ink; mark the courses from 0 to 360 just as they are noted in the book and then from this long line, whatever course you make it, along the course of the tracing cloth, you can put this protractor on wherever you are working and make it read a course on that line, and then take off any bearing you like.

The President—I suppose you use a parallel rule?

Mr. James—Yes; a parallel rule or square; sometimes one is more convenient than the other.

Mr. Walker—I have listened to this very instructive paper of Mr. McMullen's with a great deal of interest, the more so as I have been engaged myself personally during the past year in exactly similar work on the Ontario Division of the Ontario & Quebec Railway. Mr. McMullen and myself, I suppose, received similar instructions, and we have both been engaged in the same kind of work. There is one thing I should like to ask him. Of course there were no special instructions issued by the chief engineer regarding the method of making field notes, and I didn't follow the method suggested by him. Might I ask him (referring to diagram), does that represent an angle in the line of one degree? Does that represent a bend in the line?

Mr. McMullen—It does. That is my intention, to illustrate the beginning of a curve. My intention was to show this as the tangent between station 20 and 24, and then you are starting off on a curve.

Mr. Walker—The method adopted by me was usually to run the curves to intersection, measure the external and, if necessary, the intermediate points in order to arrive at the curvature. The point I wanted to mention was in regard to the convergence of the meridian. I took observations similar to Mr. McMullen's about every five miles, and of course the variation of the meridians on an east and west line is considerable. I had a line about 30 miles long, a straight line, and of course in placing a bearing on that line it would have to be referred to some particular meridian. The method I adopted was to take a meridian about the centre of the section; that is, when surveying between here and London, I took a meridian about Guelph Junction, and reduced all my bearings to that meridian, as I considered otherwise we would have to put on a different bearing on the line about every half-mile or so. So that in my work I state on my plan that all bearings are reduced to what was really the 80th meridian.

I don't know that there is anything else I have to say in regard to this matter. We were fitted up similar to Mr. McMullen with cars, and although we didn't have any adventures with chickens, still we had a very pleasant time indeed, and not long hours.

All my observations I took at night on the star. We usually took them at each station we stopped at; and it occurred to me in that way we were able, perhaps, to do a little more work than by stopping in the middle of the day to take an observation.

Mr. McMullen—I am rather glad Mr. Walker mentioned that matter about the convergence of the meridians. I found a little difficulty; although down in our country we don't have the long tangents you do in Ontario. Sometimes we would have a tangent a mile long, but very rarely.

I may say after going over a certain section of the line I found a discrepancy between the angles which had been carried on and my observations. With a transit out on a line an observation of the sun is only going to be a matter of comparatively few minutes, and I could take quite a large number of observations in one day by going along myself and just observing the sun in that way, and I found the observation of the sun very satisfactory.

The President—I think it is a very good idea to do what Mr. Walker did, in referring his courses to a certain point, for instance, about midway, at Guelph Junction; then anyone taking up his plan afterwards would be able to calculate accurately.

Where I was working last summer I was running out block lines, and they ran east and west for 18 miles, and all the lines are noted west because I changed the angle sufficiently at each six-mile corner, so that at the centre of each six-mile block the line would be due north and south, so that the course will refer to the centre of meridian. That is according to the Dominion system of survey.

Mr. Jones—I think the bearings should be made to agree with the local surveys. In Western Ontario Mr. Chalmers and I were associated in a right of way survey about 200 miles long from Port Arthur, and we allowed discrepancy of angle and convergence of meridian to be lumped together in evening up our bearings right through the country, so that each bearing was a true astronomical bearing as far as we could tell for that section of country.

[*This Association is not responsible, as a body, for the opinions expressed in its Papers by Authors.*]

CITY AND TOWN LOTS.

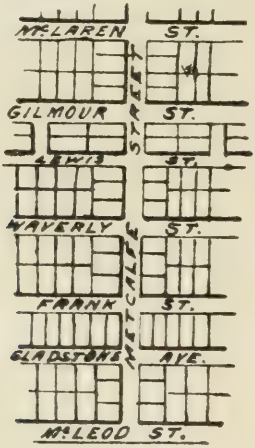
BY S. BRAY, CHIEF SURVEYOR, DEPARTMENT OF INDIAN AFFAIRS, OTTAWA, ONT.

By a Provincial Act passed about fifteen years ago it was provided that no Municipal Council, except the Council of a city or town, shall lay out any roads or streets more than 100 nor less than 66 feet in width, except where an existing road or street is widened, or unless by the permission of the Council of the County in which the municipality is situate; but any road when altered may be of the same width as formerly. And it further enacts that no highway or street of a less width than 66 feet shall be laid out by any owner of land without the consent of the Council of the municipality, by a three-fourths vote of the members thereof. This enactment has proved to be a very wise one.

No action appears to have been taken to regulate the depths of lots. This would appear to be a matter of great importance, both from an economical standpoint and on account of the public health. If lots are laid out with a depth so small that the back yards, where houses are built, are continually in the shade, the general health of the residents will certainly be more or less affected. And again, if the lots are laid out of too small a depth, the city or town in which they are situated has too great a proportion of street area to maintain for the amount of assessable land area. This point may be especially illustrated in the sketch below.

This sketch shows a portion of Metcalf Street, in the City of Ottawa, and I may say there are parts of the said city similarly laid out. Between Gladstone Avenue and Frank Street, as shown on the said sketch, there is a depth of only one lot. I may here say that the very great majority of lots in the city are only 99 feet in depth, and this is a depth very commonly adopted in many cities and towns. Again, between Lewis Street and Gilmour Street there is a similar depth of only 99 feet. In both of these cases the houses in many instances front on one street and their back yards are on the other. It is evident that the city has to construct and maintain two streets where one would be ample, and in addition to this has not only less land to assess, but on account of the fronts of the opposite lots facing on back yards, they are necessarily depreciated in value.

It may be contended that this is a state of affairs that should have been attended to by some proper officer of the municipality, who should have refused to accept the subdivision. This does not appear to be the duty of any officer. The lands were laid out, the plans filed, and the lots sold, and the city saddled with an extra street, and a large number of lots unduly diminished in assessable value.



Scale. 10 chains = 1 inch.

It is also to be noted that when a city has progressed with ordinary success, that a store 99 feet in depth is very shallow. In fact, the building cannot be built with this depth, as it is necessary to keep back from the rear line a sufficient distance to admit light at the back of the building. I think it should be admitted that 99 feet is too shallow a depth for a city or a town lot. It would, in my opinion, be a wise measure to have an Act passed limiting the depth of a block, that is to say, from one side to another in both directions, to 250 feet, thus making the lots 125 feet deep; of course subject to variation where the shape of the land or the inequality of its surface requires it.

In this connection it would evidently be also a move in the right direction if all subdivisions of lands in city, town or village lots for sale were submitted to a proper officer of the municipality for examination, he could then suggest amendments and finally approve or reject the subdivision, as the case may be. This duty could be well performed by the County Surveyor or by the City or Town Engineer, according to the location of the land.

I may be allowed to digress a little in this matter with regard to admission of sunlight. I believe it is admitted by all medical men that sunlight is essential to good health, and consequently to success in every undertaking, yet we are beginning to permit the erection of enormously high buildings in our cities which effectually prevent the sun from shining on the streets, except for a very limited time. The stores on the ground floor are necessarily always in gloom, and business has to be transacted with artificial light. It appears to be also doubtful whether my neighbor, on the opposite side of the street, has an equitable right to erect a building so as to place my offices continually in shade and gloom and compel me to the extra expense of artificial light. It is also to be remembered that if enormously high buildings are erected on both sides of the street a draft will be prevalent through the street that at times will be almost unbearable. I have been informed that there is a by-law in the City of London, England, that no building shall be erected with a height greater than the width of the street in front of it. Of course, if the owner wishes to add to the height of his building, he can place it back from the edge of the street the distance he wishes to add to its height. I think it would be greatly to the benefit of the whole Province if this matter were dealt with by the Legislature and an Act passed similar to the London by-law, limiting heights of buildings. It would thus be out of the power of any city to grant a permit under any circumstances to construct a building so high that injury would result directly and indirectly to individuals and to the public generally.

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PRELIMINARY LOCATION IN THE BUSH.

BY ROBERT LAIRD, HAILEYBURY, ONT.

An assistant locating in the extreme north, though hardworking, honest, ingenious, painstaking and unusually "bush-wise," was surely gaining the reputation of being a slow-coach with the head office, because he did not know and did not think out a very simple wrinkle connected with his work.

His ingenuity was sadly misused, and all because he had not conceived the idea that it was, and is, possible to run in a curve on the ground without establishing a single transit-point upon the curve itself; he had a firm conviction that his transitman must of necessity set the transit on the curve—preferably at the P. C., or if not there, then at the P. T.—in the case of a compound curve; he regarded the P. C. C. as a point from which he could no more escape than we all can escape the confidences of our friends.

This obsession led to disaster in the country in which he was working; primeval forest lands, with brooks and small lakes a plenty, and high, rocky hills with precipitous faces the common feature.

When his P. C., P. T. or P. C. C. fell within the margins of a lake, in the midst of a stream, or on a nearly vertical rocky wall, as was the case more often than otherwise, he described this as "—— —— hard luck" and proceeded to bridge the stream with heavy timbers, to drive long plugs for the transit legs in marshes and lake margins, or to erect platforms at rocky faces; establish thereon with care his P. C., set the transit over it, and proceed to another point on the curve—which, being out of sight because of the trees, might or might not prove suitable for a transit-point, and this was not disclosed until a line had been cut out thereto and chained; if not suitable, the building operation was repeated or the line abandoned and a second try made for another and more desirable point.

All this is easily avoidable by a much more elastic method than that of laying down a curve by its chords, i.e., by short or semi-tangents to the curve. This method—as far as I am aware—has not been amplified by any field-book writer; perhaps it has been considered too obvious and simple to merit description; but that case in point—the bridge-building person of my experience—seems to warrant a short statement regarding it.

Had he been asked to run in a curve of 10 degrees deflection, he would not have hesitated to disregard the P. C. as a transit-point, but would have measured along the tangent produced the sub-tangential distance corresponding to the degree of curvature desired, there set his transit, turned the 10 degrees, laid down the remaining sub-tangent—which is also the leaving tangent from the curve—made proper correction for chainage, and gone gaily on; but 50 degrees of curvature was to him quite a different matter.

If the first 10 degrees of a curve can be so laid down, so can the following ten, or any other number of degrees.

The leaving tangent of the first part is then the entering tangent of the second part, and for every distance along this tangent there is a corresponding angle of deflection just as truly as there was for any entering sub-tangential length; and this is true for the third or any following part.

Now, to suggest the elasticity of this method. There is no good reason for selecting a certain length of tangent or a certain number of degrees of deflection; the proper considerations which determine these are as follows:

1. Any distance along the tangent to the curve, beyond the P. C., whose abcissa distance from that curve is not too great for the convenient and fairly accurate offsetting of stakes, and such that the leveller may easily observe the elevations of the corresponding points on curve, notwithstanding the obstruction to view by trees, vegetation, etc.

2. That the point be so chosen that a good foresight from it may be had.

3. That it be suitable for a transit point.

Suppose, then, we desire to lay out a 3° curve through an angle of 50 degrees to the left of a given tangent, the P. C. of which is L. 320+57; this hub is set, if possible, and the tangent is produced to any distance at the discretion of the picketman; this distance for a 3° curve should not exceed 350 feet.

The chainmen are furnished with a table of offsets, at five-foot intervals, of tangential length; they offset, if required, to the left

L. 321, the offset for 45 feet; L. 322, that for 145 feet, etc., etc. (Should they mislay this table, they are permitted to use the approximate formula $x = \frac{7}{8} n^2 D$.)

In the meantime the transit is moved forward and set up at the end of the line. Suppose the chainage of this hub is found to be 323+62.1, being a tangential length of 323+62.1 — 320+57 = 305.1 feet; the angle corresponding is 18°.09′ and length of arc 605 feet.

This angle is turned to the left, and the picketman instructed to cut not less than 350 feet and not more than 650.

The chainage of the point on curve, ahead of the transit, where this tangent touches is: Chainage of P. C. plus the arc 320+57 + 6+05 = 326+62; the chainage of the transit point back of that curve point, and reckoning from it, is the chainage of that curve point minus the tangential length 326+62 — 3+05.1 = 323 +56.9. (The correction for chainage is made at the transit point for simplicity.)

With this chainage the men go ahead; offsetting station L. 324, offset for 260 feet; L. 325, that for 160 feet; L. 327, that for 40 feet, etc., etc., as before.

The chainage at the end of this line is found to be 329+72.8, then tangential length is 329+72.8 — 326+62 = 310.8 feet.

Corresponding angle is 18°.29′ and arc is 616.1 feet.

This angle is turned and the chainage correction made as before.

The new point on curve is 326+62 + 6+16.1 = 332+78.1.

Now, total angle turned is 18°.09′+18°.29′ = 36°.38′, leaving 58°—36°.38′ = 13°.22′ still to be run; the corresponding tangential length is 223.8 feet and arc is 445.6 feet.

The instruction to the picketman, at the second transit point, was, cut the line 310 feet to the curve point and 223.8 feet beyond it or to chainage 332+78.1 + 2+23.8 = 335+01.9.

This hub is then set correctly and the completing angle there turned. It will be noted that this hub must fall on the sub-tangent to the curve, or on the tangent passing through the P. C. C. when the curve is compounded.

Chainage is again corrected and the P. T. hub set 223.8 feet ahead of the transit point, thus completing the curve at station 322+78.1 + 4+45.6 = 337+23.7.

In the case of a compound curve the process is continued by turning off from this leaving tangent of the first branch, the angle corresponding to the distance beyond the P. C. C., proper for the second branch. (If a 1° curve, and tangent 322 feet: then the angle 6°.26′.)

The form of field notes is shown below:

P. T. L.		3÷67			
		3			
		2			
T. P.	1 >	0÷45.7 = ÷45.0		6° 26′	643.3
(322.0)		340			
		9			
		8			
P. C. C. L.		7÷23.7		1 Curve Left 6° 26′ L. C.=643.3′	
		7			
		6			
T. P.		5÷01.9 = 4÷99.9		13° 22′	445.6′
(223.8)	5 >	4			
P. L.	3 >	2÷78.1			
		2			
		1			
		330			
T. P.		9÷72.8 = ÷67.3		18° 29′	616.1′
		9			
(310.8)		8	( )		
		7	(0.4)		
C. P. L.		6÷62			
		6	(0.9)		
		5	(offset)		
		4	(17.7)		
T. P.		3÷62.1 = ÷56.9			
		3	(15.2)	18° 09′	605.0′
(3.03.1)		2	(5.5)		
		1	(0.5)	50° 00′	1666.7
P. C. L.		320÷57		3 Curve Left 50° L.C.=1666.7	

Note.—The sum of the short tangents has no relation to the sum of the sub-tangents to the curve.

You will have noticed that the stakes were offset to the curve, if required; that has not been the custom; on the contrary, stakes are set in the lines as cut, but with the initial letter before the station numbers omitted, and with the words "offset Left — ft." written on the back of the stakes, except on those stakes set where the tangents touch; these are fully marked, thus, L. 326+62.

The reasons for this: Offsets at an exact right angle are often not practicable because of the trees. (For this reason also a close calculation of abcissa is not made, that for the nearest five-foot being deemed sufficient.) The rodman and leveller readily find the stakes in this position, and use them—which is perhaps doubtful in the case of stakes hidden in underbrush—the topographer also has definite points and elevations to work from. The rear chainman has an undisturbed point at which to hold the chain; these stakes are left standing and are verified by the topographer; the chainmen know that this will be done. Foremen of clearing gangs, when properly instructed, have no difficulty in laying out the right-of-way correctly.

The chief instrumental advantages of this method, in rough ground covered by trees or broken by water, cliffs, etc., are the avoidability of short sights and the latitude possible in the choice of ground for the transit points. Curvature being introduced, largely to avoid obstructions, and the curve running around the hills, the tangents are often in better ground, being outside the curve, whereas the long chords being inside often cut across very bad ground indeed.

It might be noted, too, that for equal lengths of abcissa to a curve, there is always one less transit point by this method than by that of a chord method.

Other advantages are: The picketman and axemen do not wait for the chainage, but cut ahead to any point at the discretion of the picketman. The chainmen have plenty of time to properly do their work, and do not delay others, as the chainage of the hub at the end of the line is not required until the transit is brought forward and set up, except in one case, i.e., the final hub.

One transit point alone, no matter how long the curve (except it be compounded, when two are set) demands exact placing, and that being an unusual operation, is more likely to be properly performed. A chainman who will insist on and will secure the exact setting of a point when it is a duty repeatedly performed is a jewel rare. Errors of considerable magnitude are liable to occur, especially when one of the party is an habitual talker, the fascination of a joke completely dulls the fine edge of observation; a hub may be driven plumb, or when driven be several inches out of place, and the point taken on it anyhow, so that the point of the joke be not missed.

The procedure, to emphasize the idea in all minds, that this is an important duty and one that must be done properly, has been as follows: When a hub is to be set to chainage, the chainmen first lay off the correct plus; the picketman drives the hub, the chainmen lay off the plus again, marking a line at right angles to the transit line across the hub; the picketman takes point therein; if for any reason the hub does not contain both, the operation is repeated until it does. The essential feature of this is, that the chainmen, who are held responsible, shall repeat the measurement as often as necessary, and shall remain in position to repeat it until after the signal has been given for the transit to come ahead.

The transitman, when in position to look back along the line, sets his vernier at 180°, sights back, and revolves the upper limb but does not plunge the telescope; his vernier is now at 0°, and the angle is set off by direct reading. This was found necessary as the cross-hair diaphragms of the instruments supplied were much too thin, and in the extreme changes of temperature (often 40 degrees in a morning and as much in the afternoon) considerable hourly variations in the line of collimation were found.

The chainmen have been required to blaze a large tree on that side facing the hub, and to mark thereon all information, as at P. C.: "P. C. 3° C. Left 50°," or as at transit point: "T. P. A Left 18°.09′. 323+62.1 = 323+56.9."

The picketman's instructions included the following:

Hubs shall not be set, where avoidable, in soft ground or in ground that is worked by the roots of a wind-swayed tree, nor point taken on a stone nor on bare rock. (It is possible that tangential transit points, being, as they are, distant from centre line, may remain through construction days and furnish permanent reference marks.)

Hubs shall not be set, when approaching a steep rise, close up to the foot of it, but far enough back therefrom so that the transit may be able to see to the top of it, nor so far beyond the crown of the rise that more than two feet, at the foot of the picket, is hidden from the transit thereby.

A general order to all: No one shall stand in the line, neither between the picket and the transit, nor behind either, that their signals may not be obscured.

This method may be combined with the chord method by setting a hub at any C. P. and then proceeding in the usual way, and may be used at any time in avoiding obstructions, etc., etc.

In the event of an inaccessible P. C., the tangent is produced to a convenient point, the proper angle turned there and a point on curve set; thence the remainder of the curve is run in.

Should an obstacle cover the P. C. and prevent the production of the tangent, a hub is set in the tangent, an angle turned, and the proper tangential distance set out therefrom; through the latter point a line is run parallel to the tangent, whose length is equal to that tangential length already laid out, plus the distance from hub on tangent to P. C. This is now a point on curve, and a line through it parallel to the sight line off the tangent is also tangent to the curve, so that the remainder of the curve may be laid out therefrom as desired. An obstacle within the curve may be avoided by following a tangent from any suitable point on the curve until that obstacle is passed, thence setting a point on the curve and continuing as usual.

The field book published by Edward Butts contains a table of tangents and arcs for each minute of deflection for curves of whole degrees from this by inspection or by simple multiplication one obtains the angle and arc corresponding to the stated tangent.

[*This Association is not responsible, as a body, for the opinions expressed in its Papers by Authors.*]

AN OLD-TIMER'S HOLIDAY TRIP.

BY MR. CHARLES UNWIN, O.L.S.

Captain Gamble, our esteemed Secretary, having requested me to write a paper for the present meeting, and not being willing to accept my statement that I was unable to comply with his wish, I will do my best to supplement my former reminiscences by giving an account of a holiday trip taken during the past summer.

Our good City of Toronto gives its permanent employees two weeks' holidays during the year, and not wishing my work to get too far behind, I divided my fortnight into two parts.

During the first part I took a trip to Georgian Bay, where I had an invitation to spend some time (in fact, no time limit was set) with some friends who live on "Present Island," which place I saw for the first time in 1851 when on my way with the late Col. Dennis—afterwards Surveyor-General, but then plain John Stoughton Dennis, P.L.S.—to survey several Indian reserves along the north shore of Lake Huron.

At that time the Indians were gathering on the island for their presents, from which custom the present name of the island is derived.

The house owned by my friends on this island was built by a wealthy lumberman, and apparently money was no object to him. He evidently did not make it by surveying, for during my long life I have known of few, if any, in our profession who had made more than they could comfortably get along with.

I am told that Mr. Dodge, the former owner, had many hundreds of scow-loads of good loam put on the island, which in its natural state was like most of the islands in the Georgian Bay, nearly all bare rock or moss-covered. There is now a good garden and a most spacious mansion, with the same conveniences as are enjoyed in the best houses in Toronto, viz., hot and cold water, baths, lavatories, and in fact, everything that the most fastidious could think of. The rooms are very large and lofty—my bedroom was about 18 x 20.

Present Island is just opposite the town of Midland, about half an hour's journey by gasoline launch and about an hour from Penetanguishene, now called Penetang.

EXTRACT FROM DIARY, 1907.

Tuesday, 9th July.—Took 11.45 a.m. train for Penetang; went on parlor car with Misses Bessie and Margaret McAuley as far as Allandale, where I had to change cars for Penetang, leaving my friends in the train for Deerhurst. I was shown into a car said to be for Penetang, but soon found out that it was for Toronto, but had plenty of time to change and proceed on my way to Penetang, where I arrived about 3 p.m., meeting Miss Currie, my sister, and Messrs. Barclay, Graham, Watson, the Curries' nephew, and Garvin Langmuir.

After spending a little time in Penetang, we went in a launch to Present Island.

Wednesday, 10th, went to Penetang, where I called on an old gentleman (Mr. Thompson, now the oldest man in the town), whom I had met when visiting the place in 1851, and from whose elder brother Col. Dennis hired his men and bought his supplies for his Indian reserve surveys.

I have a very distinct recollection of our being at church together. The church was on the road between Penetang and the Reformatory. There was a good deal of brush about the church in those days, and the mosquitoes were very numerous.

Thursday, 11th, went to Midland in morning. In afternoon commenced making rough traverse of Present Island with pocket compass and a 50-foot tape, and stepped the off-sets.

Friday, 12th, continued traverse, but had not time to finish. Left for Toronto about 11 a.m., arriving at the Union Station about 4 p.m.

In 1848 I assisted on a survey of the Indian reserve on Balsam Lake, and this having been my first experience of "roughing it," I was seized with a desire to re-visit the place after an absence of 59 years.

My nephew, Mr. Chas. J. Agar, and I determined to take a trip, that I might see the place again, so left Toronto on Monday, Aug. 12th (in the second part of my annual holiday allowance) and stayed that afternoon and all Tuesday with a niece, Mrs. Cortez Fessenden, at Peterborough. She being, like myself, an early riser, we took a ramble before breakfast on Tuesday morning down to the park by the River Otonabee.

In the afternoon Mr. Fessenden and his son Vivian, my grand-nephew, with Mr. Agar and I, walked out to the lift-lock on the Trent Valley Canal and went down to see the machinery, going down under the one of the two basins which was up at the time.

On Wednesday morning Mr. Fessenden, Mr. Agar and I took G. T. R. train at Peterborough for Lakefield, at about 8.40.

Lakefield is near the southerly entrance of Stony Lake, about 10 miles from Peterborough. We left Lakefield by the steamer "Stony Lake" shortly after our arrival, and had a delightful trip on the Kawartha Lakes (or some of them.) The first lock is at Lovesick. Here we had a good dinner on the boat, and the table-girl, who announced three kinds of pie, was startled by one of the party asking her for a large piece of raspberry pie and a larger piece of cherry pie. We arrived at Burleigh Falls about 12.45 p.m., and portaged our things a distance of about 200 yards to the steamer "Ogemah." We left Burleigh Falls at about 1.15 p.m., arriving at Buckhorn at 1.25, and got through the lock at 1.38. Took in wood at 3.10, and left again at about 3.35. We had a good supper on the "Ogemah" and arrived at Bobcaygeon in due course. There were no available rooms for us at the hotel, but we were directed to "the cottage" which belongs to the owner of the hotel, and here we got three good separate rooms. On our arrival at Bobcaygeon we learned that the boat by which we were expecting to go to Coboconk next morning had had its trip cancelled on account of a regatta coming off at Chemong. We were therefore compelled to make arrangements for driving, and engaged a rig at James N. Hill's livery to take us to Coboconk next morning, Mr. Hill undertaking to drive us there himself. We four, therefore, left in a comfortable carriage, drawn by a pair of good horses, about 8 o'clock on Thursday morning. Mr. Hill proved to be a jovial soul, and his laugh over a funny tale or a joke was worth travelling to hear. As we were driving through the country he said he would show us orange lilies growing in a Roman Catholic burying-ground, and so he did.

His feet are unfortunately crippled, so that he has to walk on the sides, as it were, and to wear specially constructed boots. He told us with great glee a story of someone in the barber shop sending a newcomer, who wanted to skate, down to him to borrow his skates. He "caught on" and gravely told the applicant that he had loaned them to so and so, to whom he might go—and this supposed lender was worse crippled than he!

At Fenelon Falls, where we stayed only a few minutes to make enquiries as to the best way to get to our destination, Mr. Agar hired a kodak. We then proceeded to the village of Rosedale, which is some three miles in a straight line across the lake from the southerly end of Indian Point. We arrived there about 10.30 or so and tried to hire a boat to take us to the Point. We were told that Mr. Goodman, a contractor, who had two launches and who was away with one of them with a Government engineer, would be back about noon, so we decided to wait. We had a very good dinner at Rosedale and went to see the pretty little English church. Mr. Goodman did not arrive until one o'clock, and although he had just received word from Toronto of the death of his mother, necessitating his leaving with his son for that city at about 3 o'clock, he kindly hired to us his small gasoline launch and sent his son to manage it. We got about half way to Indian Point when the launch suddenly refused to go any further (the motor wouldn't "mote"), and there we were. And the boy had to be back at Rosedale at 3 o'clock. We had a pair of oars, but there was a very rough sea on, and I must confess that I felt very uneasy, remembering that Mr. J. K. Roche, P.L.S., was drowned in this very lake.

I may give here an extract from an old note-book, recording the sad occurrence:

"Mr. J. K. Roche, one of the examiners when I was admitted into the profession in April, 1852, was drowned in Balsam Lake on the 13th September, 1859, while engaged on a Government survey, or, I think, returning from one. The newspaper account said that there was quite a gale on the lake, and his canoe-men tried to dissuade him from trying to cross, but he was most anxious to proceed, and determined to venture. The canoe upset, the men swam ashore, but poor Mr. Roche was drowned."

Young Goodman knew that Mr. T. D. Delamere, K.C., who has a summer residence at Balsam Lake, had a fine launch, so rowed in the direction of the Delamere home, and our plight being observed, the launch was sent out to us, and we were, after calling at the Delamere landing, conveyed to Rosedale. We then determined to try and reach Indian Point by land, so the horses were again hitched up and we set off for Coboconk, which burg we passed through without seeing tangible evidences of the university of which Jimuel Briggs long ago claimed to be a graduate. We drove down the roads towards the Point, but about a mile or two from the main road we were barred by a fence and confronted by a note for trespassers to beware. This fence apparently marked the north end of the Carnegie Ranch property, Mr. Carnegie now having Indian Point and lands behind it.

My nephews and I set out to walk at least a part of the way, and having gone some distance, seeing on our way some fine cattle grazing, we found another gate not locked, which we opened and proceeded on our way a little further. It was growing late, and having the long drive to Bobcaygeon ahead of us, we returned to the carriage, having taken several snapshots, among others the locked gate and the warning, and set out for Coboconk. The only chance now of reaching Indian Point was to go by launch from Coboconk, if we could find such a thing there. We enquired and found that there was one at the sawmill, but lo! the young man who had it had not enough gasoline on hand to take my nephew and me down to the Point and then across to Rosedale (to which place Mr. Hill could have driven, picking us up there), and get back with his launch to Coboconk, so we had to abandon the attempt to reach the point and drive back to Bobcaygeon.

We had supper at Fenelon Falls on our return journey, and rested the horses for about 50 minutes, then pushed on and arrived at Bobcaygeon about midnight.

Next morning, Friday, 17th, we took the steamer "Ogemah" at about 7 o'clock, and arrived at Chemong about 9 o'clock. The stages for Peterborough were crowded, but I managed to get a seat on one in front with the driver and two others, leaving my nephews to walk the six miles from Chemong to Peterborough, but fortunately for them, the owner of an express waggon, who knew Mr. Fessenden, gave them passage, and much to their delight overtook and passed us on the way to Peterborough, and they were waiting for me at a street corner when my vehicle came along.

We had splendid weather until a short time before our arrival in Peterborough, when it began to rain a little.

I may say that on our way up the lakes there was much smoke from bush-fires.

Taking it altogether, we had a very pleasant outing, although I did not get quite to Indian Point, reaching within about a mile and a half of it by water and four miles by land. We might have tried it by air, but no airship hove in sight while we were in the vicinity.

My nephews were most kind in looking after my comfort.

SUCCESSFUL ATTEMPT TO REACH INDIAN POINT.

At the end of the following week Mr. Agar and I made another attempt to reach Indian Point, having communicated with the owner of the launch at Coboconk and found that he could take us down on Saturday morning. We left Toronto from Riverdale Station on Friday afternoon, Aug. 23rd, about 5.15, and arrived at Coboconk about 9 o'clock. We made arrangements with the launch-owner to meet us at 8 next morning.

Saturday morning was dull and threatening rain. We left Coboconk about 8.30, and, after experiencing a couple of heavy showers, about 10 o'clock got to the point near where the deserted houses of the old Indian village stood at my first visit, 59 years ago. We discharged the boatman and boy with the launch, intending to return the five or six miles to Coboconk on foot, but happily Mr. Weed, Mr. Carnegie's manager, after showing us round the buildings, drove us about half of the distance.

We met at the Point four young American gentlemen who were taking a holiday. They had camped on an island near Mr. Carnegie's place, and were invited to come to the main land. They joyfully accepted the invitation and spoke most gratefully of the kindness shown to them, as we may also do, for Mr. Weed was very courteous. Mr. Carnegie himself was away from home. The ranch contains some 1,500 or 1,600 acres and many ground hogs infest it. Over 300 had been killed during the season, as the little creatures do much damage. Mr. Agar and I reached Coboconk about 12.30 p.m.

Our train was due to leave for Toronto at 3.30 p.m., but a telephone message was received at the hotel from the station that the train was delayed by a laden coal car having broken down on the track some 12 miles from Coboconk. We were in great fear that we could not get to Toronto until Monday afternoon, and we were both due at our respective offices on Monday morning; my nephew at 9.30 and I at 9 o'clock. We had some idea of getting a man to drive us to Orillia, some 50 miles away, to catch a train passing there early on Sunday morning, but the livery man was unwilling to make the trip, even if we had needed him. We were rejoiced to hear, however, that the train was coming, and when it made its appearance about 6.30, we, together with an American lady and a little girl, lost no time in boarding the one car which the engine was to draw.

I might say that we put in a strenuous protest to the agent early in the afternoon against the City Surveyor of Toronto and the Accountant of the Succession Duty Office of Ontario being left stranded by the Grand Trunk over Sunday.

Well, the train started without delay and tore along over the Coboconk branch at a rate to surprise the natives. We could not connect with the train for Toronto, which we should have done under normal conditions, but by going, via Lorneville, for Lindsay, we there caught the train from Toronto for Port Hope, via Peterborough, and we got to Port Hope Junction about 10.10 p.m.

If I was glad to get off Balsam Lake, Mr. Agar was glad to get off that train at Lindsay.

At Peterborough the train was boarded by some young fellows who had been playing baseball with a Peterborough team and who had been beaten. The liquid consolation which had been imbibed by some, and the natural flow of youthful spirits, made them, or some of them, very noisy, and unpleasantly (for lady passengers) boisterous.

They left us at Port Hope to go on to Cobourg. We had to wait in the railway station at Port Hope Junction until a few minutes after 4 on Sunday morning. We saw the comet and Orion in the early hours of Sunday. Toronto was reached about 6.10. Cabs were in demand, but we got one which took a young lady passenger to the Arlington, us to Seaton street, and the American lady, Mrs. Taylor, and her little girl, to First avenue.

"Keeping everlastingly at it brings success," and by keeping at it I managed to get to Indian Point, although at the first attempt all things seemed against it. And I may say in closing that it was very interesting to me to re-visit these two scenes of work of so many years ago.

I trust that many of my young brothers in the profession may live to enjoy a green old age, "frosty, but kindly," and in their turn have the pleasure of, after the lapse of many years, looking upon the very spots of mother earth's surface upon which they planted their early pickets or handled the faithful chain.

BIOGRAPHICAL SKETCH OF C. G. HANNING'S PROFESSIONAL CAREER.

A native of the County Cork, Ireland. Born in the year of grace 1826. Entered Trinity College, Dublin, October, 1843. Went through the Engineering course in the School of Engineering attached to the College. After the prescribed time passed my examinations and obtained my diploma from that school. In 1846 and 1847 engaged in Sir John MacNeil's office, Dublin, and also for several months on the survey and construction of the G. S. W. Ry., Dublin to Cork, in the neighborhood of both city of Cork and town of Mallon.

In the year following (1848) came to Montreal in August, and in November following was engaged as Assistant Engineer on the re-measurement of the St. Lawrence and Atlantic Railway (now the G. T. Ry.), between Montreal and St. Hyacinthe, the only part completed then; on this work several months. In the autumn of 1850 came to Brantford, and as rodman was on the survey of the G. W. Railway between Woodstock and a point some miles west of London. Early the next year was leveller on the final location of line between these points, and then first assistant on construction of same line from Woodstock to middle branch of River Thames, some 13 miles. On this work to end of December, 1853, when I resigned and went back to the Old Country. Returning to Canada after eight months and not being successful in obtaining employment as a civil engineer, I turned my attention to other pursuits; took up my residence in Montreal, and went into commercial business.

Before doing this, in the summer of '54, A. McBean, railway contractor, and myself, walked over the newly located line of railway from Brockville to Arnprior for the purpose of inspection of country, etc., before he tendered for the construction of part of it.

The business I was in at Montreal not coming up to my expectations, I left there November, 1856, and came to Bowmanville, and went as assistant to the late Messrs. Herrick and W. Napier, who had an engineering and surveying office there. When with them I assisted W. Napier in a preliminary survey for a proposed railway from Colborne, on Lake Ontario, to the rear of the country, via Castleton.

Messrs. H. and N. leaving Bowmanville, I articled myself to the late L. Shortt, P.L.S., for one year, and in July, 1858, obtained license to practice as P.L.S.

In May, 1860, I got instructions from the Crown Lands Department to survey the townships of Rore and Lefroy, on the north shore of Lake Huron, also to run a line for public road across St. Joseph Island. This and other work for the Huron Bay Copper Mining Co. did not permit my return until July, 1861. From that date to July, 1865, I surveyed for private individuals and municipalities, and for the townships of Darlington and Clarke. Under instructions from the C. L. Dept. re-surveyed several blocks of concessions, planting permanent monuments at the angles of each township lot and making plans in duplicate of each survey. In July, 1865, came to Pit Hole, in the oil regions of Pennsylvania, and in company with W. Murdock, P.L.S., had good success for eight or nine weeks, staking out locations and preparing plans of same for the oil speculators, but owing to ill-health had to come away.

January, 1866, came to the oil region at Bothwell, Ont., and in partnership with W. Murdock and P. A. Peterson, late chief engineer of the Canadian Pacific Railway, carried on the same work as at Pit Hole until the month of April, when a general collapse of all kinds of business took place owing to the Fenian Raid scare, the speculators from Chicago and elsewhere leaving in a hurry without settling up accounts, I regret to say.

'66 and '67 private and municipal surveys, prepared plans of the town of Bowmanville and the villages of Newcastle and Orono. December, 1867, came to Nova Scotia to take charge of construction of eight miles of railway from coal mines at Westville to tidal waters of Pictou Harbor. Returned to Bowmanville in December, 1868.

October, 1869, took charge of the final location of that part of the Toronto & Nipissing Narrow Gauge Railway line between Stouffville and Cannington, and also of the construction of the roadbed between same points until the completion of same in March, 1872, changing my residence to Uxbridge in the meantime.

In March, 1872, ran a preliminary line for branch railway from Stouffville to Sutton and Lake Simcoe (Jackson's Point), and made an approximate estimate of cost of same for the promoters.

In 1873 re-measured rock cutting and other work on newly-built line between Galt and Blair, on the Galt and Berlin Railway, to adjust dispute between the contractor and the Corporation of Galt.

In the autumn of same year, under instructions from Mr. Wragge, chief engineer of the Toronto, Grey & Bruce Railway, located railway line from a point east of the village of Wroxeter to Teeswater, and prepared right-of-way plans for same. Between years 1872 and 1876, besides the above railway work, made several surveys under instructions from the Crown Lands Department for the township municipalities of Uxbridge, Georgina, Eldon, Brock and Cartwright; re-surveys and permanent monuments, as before mentioned, and also located the extension of the Toronto & Nipissing, Coboconk to Norland, eight miles, but not built.

In May, 1876, located line and got up plans for construction of railway from Port Perry to Lindsay, and had charge of same until its completion, September, 1877. Previous to this, got up the right-of-way survey and ground plans on branch line Stouffville to Lake Simcoe. 1877 to October, 1880, engaged in municipal and other surveying work. At the latter date, under instructions from Jas. Ross, C.E., commenced location of a railway line from Napanee to the village of Tamworth, via Newburgh and Yarker villages. Engaged in this work and preparing plans and estimates of same early the following year.

In the spring of same year located the extension of the C. V. Railway from Ingersoll to St. Thomas, under instructions from Jas. Ross, then superintendent of the C. V. Railway. Also got up estimates for drainage for part of the township of Ops in the summer.

October, 1881, received instructions from Hugh Lumsden, chief engineer of the O. & Q. Railway (now C. P. Ry.) to locate the line from West Toronto Junction to a point where the Manvers Station is at present. Finished this in the spring of '82, and had charge of construction from Agincourt Station to Claremont, and of the ballasting, Agincourt to Myrtle Station, until September, 1884. Came to live in Toronto, November, 1883.

January, 1885, surveyed, made plan and subsequently subdivided Georgina Island, Lake Simcoe, for the Indian Department. Same year, October to December (three months) on re-measurement work for the C. P. Railway north of Lake Superior, and at intervals afterwards. 1886 entered into partnership with Chas. Murphy, P.L.S., and later on took in H. L. Esten, P.L.S.. July to November, 1887, under instructions from the late A. Macdougall, C.E., of the City Engineer's staff, engaged on survey north of Toronto to ascertain if a sufficient supply of water for the city could be obtained from the lakes on the Oak Ridges and sources of the Don River; also had levels taken to Lake Simcoe, plans, profiles and estimates prepared and made out and duly submitted to the City Engineer.

In 1880 myself and H. L. Esten prepared plan of right-of-way of the proposed B., H. & T. Railway, from the Humber to Simcoe street, in Toronto; also plan of Stouffville. 1890, dissolved partnership with Murphy and Esten and came to reside in Preston the following year, practically retiring from all active work outside the limits of the immediate neighborhood, and only living here because my son, a lawyer, had his practice here.

C. G. HANNING.

Preston, July 17th, 1904.

BIOGRAPHICAL SKETCH OF MILTON C. SCHOFIELD'S PROFESSIONAL CAREER.

Guelph, 7th March, 1898.

I enter my 80th year to-day, being born on the 6th day of March, 1819, in the Township of Bastard, in the County of Leeds.

I was early placed in my father's general country store, in which he kept drugs and the post office. As I preferred a more active and outdoor life, I chose surveying, and licensed in September, 1843, after serving the then required apprenticeship of (6) six months with the late George Bruce. I soon discovered the apprenticeship was far too short, even if continuously employed, though I readily passed my examination under the late Andrew Russell, but principally theoretical.

In 1845 I was employed to re-survey the road from Owen Sound to within four miles of Guelph, a distance of over 80 miles, the Government having granted a large sum to be expended thereon. There were but 43 buildings then in Owen Sound, only four being frame.

I was employed most of 1846 in Fergus and neighborhood. In 1848 I opened a country store on the rocky Saugeen, in Bentinck, four miles north of present town of Durham.

In 1849 I was appointed postmaster. In 1850 I built a mill on the "Rocky." The following winter the late J. S. Dennis laid out part of Bentinck and Glenelg. Soon after the late David Gibson surveyed the Durham road from Mono Mills, also the town plot of Durham. The late Mr. Brough near about the same time surveyed the township of Brant. All three parties obtained their mail matter and some supplies at my store.

Mr. Brough was taken sick in camp while surveying township of Saugeen, and was carried through the woods a long distance to Kincardine, at which place or Goderich he died.

In 1853 I commenced sub-dividing six hundred (600) acres in Berlin for the late Sheriff Grange of Guelph, for whom, and others, I done much in Guelph, and continued laying out town sites between it and Stratford during building of the G. T. Railway, after which I re-surveyed many villages and prepared maps for registration in Waterloo and adjoining counties.

I had some fine long surveys in Stratford, Goderich, Chippewa and Queenston. I settled in Berlin in 1859, when just 40, quite young enough to marry. I moved to Guelph in 1880 and confined my practice to the city. In 1887 I was forced to relinquish practice owing to loss of hearing, but sight remains good and I use no glasses—have none.

In May, 1897, becoming free of sciatica, of 21 years' torture—rheumatism, after effects of la grippe and other ailments, I ventured in July to survey "Beauty Island," one and a quarter miles from Little Current. I camped out a few nights, got wet three times, and returned in September in far better condition in every respect than when I left, first of July. I am endeavoring to get survey of another island this summer. Want of hearing is not such embarrassment on such work as where greater accuracy is required.

MILTON C. SCHOFIELD.

BY-LAWS OF THE

Association of Ontario Land Surveyors

AS REVISED 1899

(*To take the place of all previous By-laws passed by the Association.*)

Definitions

Definitions in the following By-laws as defined by the "Ontario Land Surveyors' Act."

The word	"Association"	means	The Association of Ontario Land Surveyors.
"	"Council"	"	The Council of Management.
"	"Board"	"	The Board of Examiners.
"	"Chairman"	"	The Chairman of Council.
"	"Secretary"	"	The Secretary-Treasurer.

PREAMBLE.

Authority for By-Laws.

The following By-laws are enacted under the powers granted by the "Act respecting Land Surveyors," Cap. 180, R.S.O., 1897.

THE ASSOCIATION.

Annual Meeting of Association.

1. The Annual General Meeting of the Association shall be held (as provided by the said Act) in the City of Toronto, on the fourth Tuesday in February in each year, at such place as may be selected by the Council.

Special Meetings.

2. Special meetings of the Association may be called by the President, or shall be called by him at the written request of ten or more members.

Notice to be given by Secretary.

3. Due notice of such meetings shall be given by the Secretary to each member of the Association by circular letter posted to his registered address at least 10 days before any such meeting.

Constitution of quorum.

4. Fifteen members shall form a quorum at any meeting of the Association, for the transaction of business.

THE COUNCIL.

Duties of Council.

5. In addition to the duties assigned to the Council by the said Act, it shall have the direction and management of all the affairs of the Association, and shall appoint the several Standing Committees and name the Chairman of each.

6. There shall be two regular meetings of the Council in each year, one to be held during the Annual Meeting of the Association, and one on the third Tuesday in April.

Regular Meetings of Council.

7. Special meetings may be called by the President or Chairman.

Special Meetings of Council.

8. Due notice of every such meeting shall be given by the Secretary to each member of the Council.

Notice to be given by Secretary.

9. At any meeting of the Council when business relating to the property or to the financial affairs of the Association is transacted, five members shall form a quorum; for the transaction of any other business three shall form a quorum.

Constitution of quorum.

10. The Council shall make a report of the affairs of the Association at the Annual Meeting, which report shall include the report of the Secretary and also of the Board of Examiners.

Annual Report of Council

11. The Board of Examiners shall make a report to the Council at the Annual Meeting of the Association in each year.

Board of Examiners to report to Council.

STANDING COMMITTEES.

12. The Standing Committees shall be as follows: Each shall be composed of not less than 5 and not more than 9 members.

Standing Committees.

Committee on Land Surveying.
" " Drainage.
" " Engineering.
" " Topographical Survey.
" " Entertainment.
" " Publication.

13. Each Standing Committee appointed by the Council shall endeavor to advance the interests of the Association in that branch allotted to it.

Duty of Standing Committees.

Meetings of any Standing Committee shall be held at the call of the Chairman, three members to form a quorum.

Provision for Meetings.

Each Standing Committee shall present to the Association, or to the Council, an Annual Report on the work done by said Committee.

Standing Committees to report to Association.

ORDER OF BUSINESS AT MEETINGS OF ASSOCIATION.

14. The following shall be the order of business at the meetings of the Association:

Order of Business.

(1) Reading of minutes of previous meeting.

(2) Reading of correspondence.

(3) Reports and papers.

(4) Unfinished business.

(5) New business.

(6) Nomination of officers (if at the General Annual Meeting.)

(7) Adjournment.

RULES.

Procedure

15. All motions must be in writing, and shall contain the names of the mover and seconder, and must be read from the Chair before being discussed.

Reports of Committees.

16. Reports of Committees must be in writing and signed by the Chairman thereof.

Rules of speech.

17. No member shall speak on any subject more than once, except the introducer of the subject, who shall be entitled to reply; every member, however, shall have the right to explain himself, subject to the discretion of the Chairman.

Discussion Closed.

18. When a motion has been finally put to the meeting by the Chairman, all discussion thereon shall be closed.

Majority vote may re-open any motion.

19. Any motion may be re-opened by a majority vote of those present.

Appointment of Scrutineers.

20. The Chairman of the meeting shall appoint two scrutineers when a ballot is taken, as defined in Sec. 22 hereof.

Speakers to Address the Chair.

21. Every member while speaking shall address the Chairman.

Voting at General or Annual Meetings.

22. All voting at any General or Annual Meeting shall be by standing vote, unless a ballot be demanded by at least two members.

Parliamentary rules to govern.

23. Parliamentary rules to govern in all cases not provided for in preceding sections.

DUTIES OF OFFICERS.

Presiding officer at Association meetings.

24. The President, or in his absence the Vice-President, shall preside at all meetings of the Association; in the absence of both, the meeting shall appoint a Chairman.

Presiding Officer at Council Meetings.

25. The Chairman shall preside at all meetings of the Council; in his absence the meeting shall appoint a presiding officer.

Duties of Secretary-Treasurer.

26. In addition to the duties assigned to him by the said Act, the Secretary-Treasurer shall keep an accurate record of the proceedings at all meetings of both the Association and the Council in separate books, conduct all correspondence, announce all meetings, report the result of elections to the Commissioner of Crown Lands, the officers of the Association and the candidates for election, receive all fees and subscriptions and other moneys. He shall, under the direction of the Council, deposit all moneys in such bank or other financial institution as it may select. He shall pay no bills unless sanctioned by the Council and signed by the Chairman. All payments of $10 and upwards to be made by cheque, signed by the Secretary, and countersigned by the President, or in his absence by the Chairman of the Council. He shall submit an account of all moneys received and paid by him under the said Act and these By-laws to the Council at the Annual General Meeting of the Association, and shall perform such other duties as may from time to time be assigned by the Council or the Association.

The Sec.-Treas. to give bond. Where they shall be deposited.

27. The Secretary-Treasurer shall give a bond in the usual form to the amount of $1,000, such bond to be in the custody of the President, and deposited in the bank where the funds of the Association are kept.

EXAMINATIONS.

Examination of candidates for apprenticeship.

28. Candidates for admission to apprenticeship are to be examined as follows, in the subjects prescribed in Rev. Stat. Ont., c. 180, s. 22; and no candidate shall be admitted unless he obtains at least the minimum marks set opposite each subject, and at least a total of 550.

	Subject.	Max. Marks.	Min. Marks.
1.	Penmanship	50	30
2.	(a) Orthography (including dictation)	50	40
	(b) English Grammar	50	25
3.	Arithmetic (Fractions, Decimals, Square Root)	100	60
4.	Logarithms and Algebra (including Equations 1st degree)	100	60
5.	Euclid (Books 1, 2, 3 and 4)	100	60
6.	Plane Trigonometry and Rules for Spherical ...	100	50
7.	Mensuration of Superficies	50	30
8.	Linear Drawing (use of ruling pen and construction of scales)	50	25
9.	Canadian and General Geography	50	25
10.	Canadian History	50	25

Examination of candidates for admission to practice.

29. Candidates for admission to practice are to be examined as follows in the subjects prescribed in Rev. Stat. Ont., c. 180, s. 25; and no candidate will be admitted unless he obtains at least the minimum marks set opposite each subject, and at least a total of 1,000.

	Subject.	Max. Marks.	Min. Marks.
1.	Geometry, including the first 6 books of Euclid, excepting the last thirteen propositions of the fifth book	100	50
2.	Algebra (simple and Quadratic Equations, Progressions and Exponents)	100	50
3.	Trigonometry (Plane and Spherical)	100	60
4.	Mensuration of superficies and laying out and dividing land	150	75
5.	Descriptions by metes and bounds	100	75
6.	Use and Adjustment of Instruments for surveying and levelling	100	70
7.	Laying out of curves	50	30
8.	Practical Astronomy, including finding of Time, Latitude, Longitude, Azimuth, Variation of Compass, and drawing Meridian Lines	150	90
9.	Survey Act	150	90
10.	Mines Act, Registry Act, Municipal Act, (so far as they relate to surveys and drainage), Ditches and Water-courses Act	100	50
11.	Levelling	50	35
12.	Principles of Evidence and drawing up Affidavits	80	40
13.	Taking of Field Notes and Preparing of Plans	100	60
14.	Geology and Mineralogy, (rudiments of)	75	40
15.	Elementary Botany and the Forest Flora of Canada	50	25

30. If a candidate for admission to practice obtains at least the total of 1,000 marks, but fails to obtain the minimum marks in, at least, two of the subjects, such candidate may at a subsequent examination be examined only in the two subjects in which he has failed.

The Board to regulate examinations.

31. The Board may make, from time to time, such regulations as it considers necessary for the proper carrying out of these examinations.

Complaints against members or any unlicensed practitioner to be filed with Secretary.

32. Any complaint against a member of the Association or against any unlicensed practitioner, shall be filed with the Secretary, who shall immediately forward the same to the Chairman.

The Chairman may call a special meeting.

If the matter complained of is of a serious and pressing nature, the Chairman may, at his discretion, call a special meeting of the Council for the purpose of hearing said complaint; if not so acted on, the complaint shall be heard at the next regular meeting of the Council.

Procedure where the delinquent is a member.

In the case of a member of the Association, the Council shall take action as defined in the said Act.

Procedure where the delinquent is an unlicensed practitioner.

In the case of any unlicensed practitioner, the Council, if satisfied as to the justice of the charge, shall name a prosecutor and direct him as to his action in the conduct of the case, and shall allot such portion of the penalties, or authorize the payment of such fees as it may deem expedient.

The Council has power to pass By-laws.

33. The Council shall have power to pass any By-law which it deems expedient for the good of the Association, and such By-law shall have the same force until the next Annual Meeting, as if it had been passed by the Association. Such By-law must be reported to the Association at the next Annual Meeting, and the action taken thereon. All members of the Association shall be notified by the Secretary of the passing of such By-law by the Council.

34. Grants exemption from dues, under 55 V., c. 34, s. 10 (4), to Henry Strange, Milton C. Schofield, William Robinson, Joseph Kirk, Charles Fraser, Joseph M. O. Cromwell, H. O. Wood, F. H. Lynch-Staunton, and E. C. Caddy.

35. The annual fees to this Association paid by candidates admitted to practice at the session of the Board in February in any year shall cover the annual dues for the remainder of the then current Association year, and for the Association year immediately following the same.

36. Grants exemption from dues under 55 V., c. 34, s. 10 (4) to Thomas Coltrin Keefer, Nathaniel Edward Low, Thomas Cheesman, James McCallum, and Thomas W. Walsh.

37. Grants exemption from dues under 55 V., c. 34, s. 10 (4), to Royal Wilkinson Hermon.

38. Reduced the number of minimum marks in the subject of "Levelling." (Obsolete.)

39. "Whereas any registered surveyor desiring to give up practice can have his name removed from the registered list of practitioners at any time, upon giving written notice of such desire, and whereas it is desirable

that such surveyors may contribute papers and secure the reports of the transactions of this Association and exchanges, therefore this Council hereby enacts that such surveyors shall have the aforesaid privileges upon the payment of an annual fee of two dollars, and their names shall be printed in the list of members in the annual report of Association and properly marked.''

40. Grants exemption from dues, under 55 V., c. 34, s. 10 (4), to Tom S. Rubidge and James A. Gibson.

41. Grants exemption from dues, under 55 V., c. 34, s. 10 (4), to Charles J. Wheelock, Thomas Weatherald, Michael Deane, John Smith Brown, and William Edward Yarnold.

42. Grants exemption from dues, under 55 V., c. 34, s. 10 (4), to Alexander Davidson.

43. Grants exemption from dues, under 55 V., c. 34, s. 10 (4), to Charles Unwin, Wm. R. Rombough and Henry Winter.

44. Changes the name of ''Committee on Topographical Surveying'' to ''Committee on Topographical Survey.''

45. Whereas any registered surveyor desiring to give up practice can have his name removed from the list of practitioners upon giving written notice of such desire, and whereas it is desirable that such surveyors may contribute papers and secure the reports of the transactions of this Association, therefore it is hereby enacted that such surveyors shall have the aforesaid privileges upon the payment of an annual fee of one dollar, and their names shall be printed in the list of members in the Annual Report of the Association and properly marked.

46. Grants exemption from dues, under 55 V., c. 34, s. 10 (4), to George Alexander Stewart.

RULES AND REGULATIONS
OF THE
Board of Examiners for Ontario Land Surveyors.

Adopted by the Board of Examiners.

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1. The examination sittings shall commence each day at 9.30 a.m., continue until 12.30 p.m., recommence at 1.30 p.m., and continue until 4.30 p.m., day by day until completed, subject to the direction of the Board.

2. All the papers will be collected at the close of each sitting, and candidates will not be permitted to write on any question on such papers at any future sitting.

3. Any candidate obtaining assistance during the hours of examination, by copying the papers of another candidate or otherwise, will at once be dismissed, and any candidate who shall permit such copying or give such assistance will be considered equally guilty and treated similarly.

4. The candidate shall sign each sheet and mark on the top the number thereof and of the subject or group of subjects. He shall mark in the margin the number opposite each question, and shall attach the several sheets, together with the examination paper, to the cover provided for that purpose.

5. The candidate shall not write on one line more than one step in geometrical or algebraic work. A single step may cover several lines, but two or more should in no instance be put on the same line. They should be written thus:

Because $A = B$
And $B = C$
Therefore $A = C$

6. No other person than the examiners, the secretary and the candidates shall be admitted into the examination room unless by permission of the Board.

7. No books or diagrams of any kind, except those allowed by the Board, shall be brought into the examination room.

8. Candidates are to present themselves punctually at the hours appointed for the commencement of the examinations, and no candidates will be allowed to enter the examination room later than fifteen minutes after that time, nor will any candidate be permitted to leave the room during a sitting, but so soon as he has finished his papers he may hand them to the secretary, after which he will not be allowed to re-enter until the next sitting.

9. A candidate rejected by the Board shall not be entitled to a new examination before the next regular meeting of the Board.

10. Each candidate for "Admission to Practice" shall bring with him an instrument suitable for taking the necessary observations required in Sec. (8), By-law 29, which he shall submit to the Board for their examination and approval, and he shall also submit a plan and field notes of a survey, both made by himself, which may be filed with his papers.

11. Each candidate for Admission to Apprenticeship shall bring with him a ruling pen and scale.

FEES.

12. The following fees shall be paid to the Secretary-Treasurer for the use of the Association:

(1) By every person duly authorized to practise as a land surveyor under the provisions of this Act, on applying for registration under this Act, the sum of $1.

(2) By each member of this Association, an annual membership fee of $4.

(3) By each apprentice at the transmitting to the Secretary the indenture or articles of such apprenticeship, $10; 62 Vic. 2, c. 11, s. 18.

(4) By each candidate for the preliminary examination on presenting himself for examination, $10.

(5) By each candidate for examination, with his notice thereof, for receiving and entering such notice, $1.

(6) By each applicant obtaining a certificate, as fee thereon, $2.

(7) By each applicant receiving a certificate to practise, as an admission fee, $30.

(8) By each apprentice with each transfer of articles as a fee for registering the same, $2.

(9) By each applicant receiving a certificate to practise, being the fee for official notice in the *Ontario Gazette*, $1. 55 V., c. 34, s. 7; 69 V., c. 27, s. 26.

LIST OF MEMBERS

1908

The names of those members granted exemption by By-laws ratified by the Association are marked *.

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Abrey, George Spencer, Toronto Junction	6th April, 1906
Allan, John Richard, Renfrew Grad. S.P.S.	6th Nov., 1894
Ardagh, Arthur Gowan, Barrie	18th Feb., 1908
Aylsworth, Charles Fraser, Jr., Madoc D.L.S.	8th Jan., 1886
Aylesworth, John Sidney, Sharp's Corners, Ont. D.L.S.	9th Jan., 1871
Aylsworth, William Robert, Belleville, P.O. Box 2 D.L.S.	8th Nov., 1861
Baird, Alexander, Leamington C.E.	7th July, 1877
Barrow, Ernest George, Hamilton D.L.S., Mem. Can. Soc. C.E., City Engineer.	4th Oct., 1877
Bazett, Edward, Huntsville D.L.S.	8th July, 1881
Beatty, David, Parry Sound D.L.S.	12th July, 1869
Beatty, Herbert John, Eganville Grad. S.P.S.	8th Nov., 1893
Beatty, Walter, Delta D.L.S. M.P.P.	19th July, 1858
Bell, Andrew, Almonte B.A., Mem. Am. Soc. C.E., Mem. Can. Soc. C.E., Mem. Ont. A.A., D.L.S.C.E.	14th Oct., 1901
Bell, James Anthony, St. Thomas D.L.S., Co. Engineer, Elgin; City Engineer, St. Thomas.	11th Oct., 1875
Bigger, Charles Albert, Ottawa, 145 Gloucester St. D.L.S., A.M. Can. Soc. C.E., B.C.S., Astronomer, Dept. Interior.	6th Jan., 1882
Bingham, Edwin Ralph, Port Arthur D.L.S.	17th Feb., 1906

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Blake, Frank Lever, Toronto, Meteorological Office D.L.S.	13th April, 1875
Blair, William John, New Liskeard Grad. S.P.S.	13th Feb., 1904
Bolton, Ellsworth Doan, Listowel B.A.Sc. (McGill).	7th Nov., 1899
Bolton, Lewis, Listowel D.L.S.	9th July, 1864
Booth, Charles Edward Stewart, Toronto, 39 Bloor st. e. D.L.S.	6th April, 1882
Boswell, Elias John, C.P.R. Construction Dept. Offices, Winnipeg, 135 Carlton st. Grad. S.P.S., D.L.S.	7th Nov., 1896
Bowman, Clemens Dersteine, West Montrose	10th July, 1879
Bowman, Herbert Joseph, Berlin D.L.S., Grad. S.P.S., Treasurer County Waterloo, Assoc. Mem. Can. Soc. C. E.	7th Jan., 1887
Bowman, Edgar Peterson, West Montrose	17th April, 1907
Bray, Edgar, Oakville D.L.S.	6th Oct., 1866
Bray, Lennox Thompson, Amherstburg D.L.S.	17th Feb., 1902
Bray, Harry Freeman, Oakville D.L.S.	10th July, 1882
Bray, Samuel, Ottawa, Dept. of Indian Affairs D.L.S., C.E.	6th Jan., 1877
Brian, Michael Edward, Windsor B.A. Sc.	17th Feb., 1906
Brown, David Benjamin, Cornwall D.L.S.	23rd Feb., 1904
Brown, George Laing, Morrisburg Grad. S.P.S.	19th Feb., 1898
*Brown, John Smith (address not known) D.L.S.	8th July, 1852
Browne, Harry John, Toronto, 203 Albany Ave C.E.	6th July, 1872
Browne, William Albert, Toronto, 18 Toronto st.	10th April, 1876
Burd, James Henry, Parry Sound Grad. S.P.S.	2nd Oct., 1905
Burgess, Edward LeRoy, Ottawa, 21 First Ave	6th May, 1905

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Burt, Frederick Percy, New York, N.Y. President "The American Architect," Times Bldg., New York.	8th July, 1885
Burwash, Nathaniel Alfred, Toronto, 113 Bloor St. D.L.S., Grad. S.P.S.	6th May, 1905
Bush, Clayton Elgin, Toronto Grad. S.P.S.	15th May, 1908
Butler, Matthew Joseph, Deputy Minister of Railways and Canals, Ottawa C.E., M.I.C.E., Mem. Am. Soc. C.E., Mem. Can. Soc. C.E.	11th Jan., 1878
Byrne, Thomas, Sault Ste. Marie D.L.S.	15th July, 1862
Caddy, John St. Vincent, Ottawa, 559 King st. D.L.S.	6th Oct., 1866
Cameron, Alfred John, Peterborough	9th April, 1889
Campbell, Archibald William, Toronto, Parliament Buildings C.E., Deputy Minister of Public Works.	10th April, 1885
Carre, Henry, 276 Albert st., Belleville, Box 203 M.O. & Georgian Bay Canal, B.A. and C.E. (Trin. Coll., Dublin), D.L.S	8th Nov., 1861
*Carroll, Cyrus, Prince Albert, Sask. Mem. Can. Soc. C.E., D.L.S. District Surveyor and Engineer.	10th Jan., 1860
Casgrain, Joseph Philippe Bâby, Montreal D. L. S., P. L. S., (Que.) C. E., Assoc. Mem. Can. Soc. C. E., Chief Eng. M. & P. J. Ry., Senator.	5th Jan., 1887
Cavana, Allan George, Orillia D.L.S.	8th July, 1876
Chalmers, John, Engineer's Office, C.N.R., Winnipeg Grad. S.P.S.	14th April, 1896
Chipman, Willis, Toronto, 103 Bay st. D.L.S., B.A.Sc. (McGill), Mem. Am. Soc. C.E., Mem. Can. Soc. C.E.	4th Oct., 1881
Christie, Uriah Wesley, Chesley	1st March, 1906
Clarke, Fred. Fieldhouse, Winchester, Ont. Grad. S.P.S.	31st March, 1905
Clarke, Leonard Oswald, North Bay	14th Feb., 1903
Code, Abraham Silas, Alvinston	14th April, 1896
Code, Samuel Barber, Smith's Falls	1st May, 1905
Code, Thomas George, Alvinston	17th April, 1907
Code, Richard Stanley, Alvinston	17th April, 1907
Cotton, Arthur Frederick, North Bay	11th July, 1874
Cozens, Joseph, Sault Ste. Marie D.L.S.	7th July, 1875
Crerar, Samuel Rutherford, Toronto, School of Science D.L.S., B.A.Sc., Toronto.	1st March, 1906

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Dalton, John Joseph, Weston, Ont D.T.S.	11th Jan., 1878
*Davidson, Alexander, Arkona D.L.S.	11th Oct., 1858
Davis, Allan Ross, 230 Portage Ave., Winnipeg, Man. B.A. Sc. (McGill).	8th Jan., 1886
Davis, William Mahlon, Berlin Grad. R.M. Coll. (Kingston), Town Engineer.	11th April, 1885
Deacon, Thomas Russ, Winnipeg Grad. S.P.S.	12th Nov., 1892
Deans, William James, Brandon, Man. D.L.S.	11th July, 1884
DeMorest, Richard Watson, Sudbury M.E.	9th April, 1889
Dickson, James, Fenelon Falls D.L.S.	6th April, 1867
Dixon, Howard, Can. Nor. Ry., Winnipeg Grad. S.P.S.	14th Feb., 1903
Dobie, James Samuel, Thessalon B.A.Sc. (Toronto Univ.), D.L.S.	21st Feb., 1898
*Doupe, Joseph, Winnipeg, Man., 169 Edmonton st. C.E. (McGill), D.L.S., P.L.S. (Man.), P.L.S. (B.C.).	13th Jan., 1863
Dunn, Thomas Hamilton, Winchester. Grad. S.P.S.	14th May, 1906
Empey, John Morgan, Ottawa D.L.S.	16th Feb., 1907
Esten, Henry Lionel, Toronto, 157 Bay st.	7th Jan., 1887
Evans, John Dunlop, Trenton D.L.S., Mem. Can. Soc. C.E., Chief Eng. Cent. Ont. Ry.	8th July, 1864
Fair, John, Brantford	13th April, 1875
Fairbairn, Richard Purdom, Toronto, 452 Markham st. Surveyor for Dept. of Pub. Works, Ontario.	7th Oct., 1876
Fairchild, Charles Court, Brantford Grad. S.P.S., D.L.S.	9th April, 1894
Fairchild, William Howard, Brantford	17th Feb., 1900
Farncomb, Alfred Ernest, Red Deer, Alberta D.L.S.	9th April, 1895
Farncomb, Frederick William, London, 213 Dundas st.	6th Nov., 1889
Fawcett, Thomas, Niagara Falls Dom. Topographical Surveyor.	6th Jan., 1881

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Fitton, Charles Edward, Orillia, Box 142 D.L.S.	10th April, 1879
Fitzgerald, James William, Peterborough	13th Feb., 1904
Flater, Frederick William, Chatham	9th April, 1888
Ford, William Butterton, Wabana, Nfld.	21st. Feb., 1898
Francis, John James, Sarnia P.O., Box 304 D.L.S.	16th Oct., 1861
Fuce, Edward Oliver, Galt.	17th Feb., 1906
Fullerton, Charles Herbert, New Liskeard D.L.S., Grad. S.P.S.	7th May, 1906
Galbraith, William, Bracebridge D.L.S.	4th April, 1883
Gamble, Killaly, Toronto, 31 Sussex Court. D.L.S., P.L.S. (Man.), Sec. Assoc. O.L.S., Captain R.A. (Ret').	6th April, 1888
Gardiner, Edward, St. Catharines D.L.S.	6th Jan., 1866
Gaviller, Maurice, Collingwood, Box 164 C.E. (McGill), D.L.S.	6th Jan., 1866
*Gibson, James Alexander, Oshawa D.L.S.	7th April, 1855
Gibson, Peter Silas, Willowdale C.E.M.S. (Mich. Univ.), D.L.S., Mem. Can. Soc. C.E.	19th July, 1858
Gibson, Wilbert Silas, Willowdale	21st Feb., 1898
Gillon, Douglas John, Fort Frances Grad. R.I.E. Coll.	9th Nov., 1895
Graydon, Aquila Ormsby, City Engineer London	8th July, 1880
Green, Thomas Daniel, Prescott, Ont. D.L.S.	7th Jan., 1885
Griffin, Albert Dyke, B.A., Galt	11th Nov., 1890
Halford, Abraham Joseph Bartholomew, Essex Centre	
Hanes, George Samuel, Windsor. Grad. S.P.S.	6th May, 1905
Hart, Milner, Toronto, 103 Bay st. D.L.S.	11th July, 1863
Heaman, John Andrew, Kenora, Ont.	16th Nov., 1896
Henry, Frederick, London, Albion Bldg.	7th April, 1887
Hobson, Joseph, Hamilton, 346 Bay St. (south) D.L.S., Chief Eng. Grand Trunk Railway System.	3rd Oct., 1855
Holcroft, Herbert Spencer, Toronto, 182 Bloor st. w. D.L.S., B.A.Sc. (Toronto Univ.).	17th Feb., 1902

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Holland, William Hugh, Toronto, 1 Dunn Ave.	1st May, 1907.
Hopkins, Marshall Willard, Edmonton, Alta. D.L.S., B.A. Sc. (McGill), Assoc. Mem. Can. Soc. C.E.	13th Nov., 1893
Hutcheon, James, Guelph, 48 Glascow St Grad. S.P.S.	10th Nov., 1891
Irwin, James Moore, Rat Portage D.L.S.	13th Jan., 1863
Jackson, John Herbert, Niagara Falls	16th Feb., 1901
James, Darrell Denman, Toronto, 227 George st. D.L.S. B.A., B.A.Sc. (Toronto Univ.).	3rd Nov., 1891
James, Silas, Toronto, 227 George st. D.L.S.	19th July, 1858
Johnston, Herbert, Berlin Grad. S.P.S.	21st Feb., 1905
Jones, Charles Albert, Petrolea D.L.S.	8th April, 1881
Jones, John Henry, Sarnia, Box 194 D.L.S.	10th Oct., 1886
Jones, Thomas Henry, Brantford B.A.Sc. (McGill), D.L.S., City Engineer.	10th Oct., 1878
*Keefer, Thomas Coltrin, Ottawa D.L.S., C.E.	14th Aug., 1840
Kirkpatrick, George Brownly, Toronto, Dept. of Crown Lands D.L.S., Director of Surveys.	13th April, 1863
Laird, James Stewart, Essex D.L.S.	6th April, 1867
Laird, Robert, Haileybury Grad. S.P.S.	11th Nov., 1887
Lang, John Leiper, Toronto, 20 Leopold St	2nd May, 1908
Lawe, Henry, Ottawa.	6th Oct., 1860
Lewis, John Bower, Ottawa, Brunswick House D.L.S., P.L.S. (Quebec), C.E.	4th Oct., 1883
Lougheed, Aaron, Port Arthur D.L.S.	12th Nov., 1888
Low, Edward Hamilton, Sudbury. Grad. R.M.C. (Kingston).	17th Feb., 1902
*Low, Nathaniel Edward, Sarnia D.L.S.	11th July, 1856

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Lumsden, Hugh David, Ottawa C.E., D.L.S., M.I.C.E., Mem. Can. Soc. C.E., Chief Eng. Trans. Cont. Ry.	4th Jan., 1866
MacKay, James John, Hamilton	25th Feb., 1899
MacKenzie, William, Sarnia Grad. R.M.C. (Kingston).	11th April, 1896
MacKenzie, William Lyon (not known) C.E.	7th April, 1887
McAuslan, Herbert James, North Bay D.L.S., B.A.Sc. (Toronto).	19th Feb., 1906
McCaw, Robert Daniel, Welland	16th Feb., 1907
McCubbin, George Albert, St. Thomas, City Engineer's Office Assistant City Engineer.	9th Nov., 1895
McDowall, Robert, Owen Sound Grad. S.P.S., Town Engineer.	11th Nov., 1890
McEvoy, Henry Robinson, St. Mary's D.L.S.	10th July, 1875
McFadden, Moses, Neepawa, Man. D.L.S., P.L.S. (Man.).	13th April, 1858
McFarlen, George Walter, Toronto, City Hall, City Engineer's Office Grad. S.P.S.	11th Nov. 1858
McGrandle, Hugh, Huntsville D.L.S.	5th Jan., 1883
McKay, Owen, Walkerville, Ont., Box 324 M.C.S.C.E., Grad. S.P.S.	7th Jan., 1887
McKenna, John Joseph, Dublin D.L.S.	9th July, 1860
McLean, James Keachie, Ottawa, Dept. Indian Affairs D.L.S	8th April, 1876
McLean, William Arthur, Toronto, Parliament Buildings A. M. Can. Soc. C. E., Engineer of Highways.	21st Feb., 1898
McLennan, Murdoch John, Williamstown B.A.Sc. (McGill), D.L.S.	13th Nov., 1893
McMullen, William Ernest, St. John, N.B. Asst. Eng. C. P. Ry.	11th Nov., 1892
McNab, John Duncan (not known)	9th Oct., 1879
McNaughton, Alexander Lorne, Cornwall	May, 1905
McNaughton, Finlay Donald, Cornwall	25th Feb., 1899

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
McPherson, Archibald John, Brockville B.A.Sc. (Toronto Univ.), D.L.S.	10th April, 1897
McPherson, Charles Wilfrid, Dawson, N.W.T. Director of Surveys, Yukon D.L.S., Director of Surveys, Yukon.	21st Feb., 1899
McPhillips, George, Winnipeg, Man. D.L.S., P.L.S. (Man.).	9th July, 1885
Manigault, William Mazyck, Strathroy, P.O. Box 300	8th July, 1876
Miller, Frederick Fraser, Napanee D.L.S.	8th Jan., 1885
Montgomery, Royal Harp, Prince Albert, Sask. D.L.S.	6th May, 1905
Moore, John MacKenzie, London, Albion Building	9th Oct., 1879
Moore, John Harrison, Smith's Falls Grad. S.P.S.	11th Nov., 1889
Moore, William James, Pembroke	18th Feb., 1908
Morris, Alfred Edmund, Montreal, Que.	10th April, 1879
Morris, James Lewis, Pembroke D.L.S., C.E. (Toronto Univ.).	7th July, 1886
Mountain, George Alphonse, Ottawa Mem. Can. Soc. C.E., D.L.S., P.L.S. (Que.), Engineer for Railway Commission.	9th Jan., 1884
Murdoch, William, Bowmanville D.L.S., C.E.	10th Jan., 1860
Murphy, Charles Joseph, Toronto, 157 Bay st.	6th Oct., 1886
Nash, Thomas Webb, Kingston D.L.S.	7th April, 1854
Newman, John James, Windsor	21st Feb., 1898
Newman, William, Windsor, 57 Sandwich st. w. Grad. S.P.S.	12th Nov., 1892
Niven, Alexander, Haliburton D.L.S.	8th July, 1859
Ogilvie, William, 27 Nepean st., Ottawa D.L.S.	12th July, 1869
O'Hara, Walter Francis, 236 Waverly St., Ottawa D.L.S.	14th April, 1892

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Ord, Lewis Redmond, Hamilton, c.o. Traders Bank	8th January, 1885
Parsons, Johnston Lindsey Rowlett, Regina, Sask., Box 1004 D.L.S., Grad. S.P.S.	6th May, 1905
Patten, Thaddeus James, Little Current D.L.S.	5th Jan., 1883
Paulin, Frederick William, Toronto Grad. S.P.S., Toronto.	11th May, 1908
Pinhey, Charles Herbert, Ottawa, 110 Wellington st. D.L.S., Grad. S.P.S., Assoc. Mem. Can. Soc. C.E.	12th Nov., 1888
Proudfoot, Hume Blake, Toronto, 130 Roxborough st. w. B.A.Sc. (Toronto Univ.).	6th Jan., 1882
Rainboth, Edward Joseph, Ottawa D.L.S.	11th Nov., 1887
Rainboth, George Charles, Aylmer, P.Q. D.L.S., P.L.S. (Que.).	11th July, 1868
Reinhardt, Carl, Box 303, Cobalt B.A.Sc., McGill.	25th Feb., 1899
Roberts, Vaughan Maurice, St. Catharines D.L.S.	5th April, 1887
Robertson, James, Glencoe Grad. S.P.S.	11th July, 1885
Roger, John, Mitchell Grad. S.P.S.	10th Nov., 1888
Rogers, Richard Birdsall, Peterborough B.A.Sc. (McGill), D.L.S.	9th Jan., 1879
*Rombough, William R., Toronto, 254 Borden st D.L.S.	14th Nov., 1848
Rorke, Louis Valentine, Toronto, 199 Madison Ave Grad. S.P.S., D.L.S.	14th April, 1890
Ross, George, Welland A.M. Can. Soc. C.E., B.A.Sc. (McGill), D.L.S.	10th July, 1879
Routly, Herbert Thomas, Haileybury Grad. S.P.S.	1st May, 1907
Russell, Alexander Lord, Port Arthur D.L.S., P.L.S. (Que.).	16th April, 1873
Rutherford, T. N.	18th May, 1906
*Scane, Thomas, Ridgetown D.L.S.	7th Jan., 1865

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
*Schofield, Milton C., Guelph, Ont. D.L.S.	28th Sept., 1843
Schwitzer, John Edward, C.P.R. Ry. Co., Winnipeg, Man. B.A.Sc. (McGill).	16th Nov., 1896
Seager, Edmund, Rat Portage D.L.S.	8th July, 1861
Selby, Henry Walter, 125 Howland ave., Toronto D.L.S.	8th Jan., 1876
Sewell, Henry DeQuincy, Toronto, 34 Yonge st. D.L.S., A.M.I.C.E.	9th July, 1885
Seymour, Horace Llewellyn, Edmonton, Alta. D.L.S.	2nd May, 1908
Shaw, John Henry, North Bay Grad. S.P.S.	17th Feb., 1900
Silvester, George Ernest, Sudbury Grad. S.P.S.	12th Nov., 1892
Sing, Josiah Gershom, Toronto, Room 71, Confederation Life Building D.L.S., C.E., Public Works Dept.	9th Jan., 1879
Smith, Angus, Regina Grad. S.P.S., City Engineer.	14th April, 1896
Smith, George, Box 25, Lindsay Engineer for Co. Victoria and four Townships.	7th April, 1881
Smith, James Herbert, New Liskeard	27th Dec., 1904
Smith, Charles Campbell, Ottawa D.L.S.	16th Feb., 1907
Smith, Walter, Lindsay	16th Feb., 1907
Speight, Thomas Bailey, Toronto, 703 Temple Building D.L.S.	6th Jan., 1882
Stacey, Albert George, Victoria, B.C. D.L.S.	30th March, 1908
Steele, David Layton, Meaford.	May, 1905
*Stewart, George Alexander, D.L.S.	8th July, 1852
Stewart, John, (address not known) D.L.S.	11th Nov., 1887
Stewart, Walter Edgar, Aylmer	12th April, 1892
Stull, William Walter, Sudbury B.A.Sc. (Toronto Univ.).	17th Feb., 1900

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Summers, Gordon Foster, Winchester Grad. S.P.S., Toronto.	11th May, 1908
Sutcliffe, Homer Wilson, Forest, Ont. Grad. S.P.S., Toronto.	11th May, 1908
Taylor, William Verner, Montreal, Sovereign Life Building Grad. S.P.S.	7th Nov., 1896
Tench, William Eastwood, Niagara Falls	11th Jan., 1878
Townsend, David Thomas, Woodstock. D.L.S., B.A.Sc., Toronto.	17th Feb., 1906
Traynor, Isaac, Dundalk D.L.S.	16th April, 1873
Turnbull, Thomas, Winnipeg, Man., C. N. R. Eng. Office D.L.S., C.E. (Toronto Univ.).	6th July, 1878
Tyrrell, James Williams, Hamilton, Prov. & Loan Chambers, 7 Hughson St. S. C.E. (Toronto Univ.), D.L.S., Co. Eng. for Wentworth.	8th April, 1885
*Unwin, Charles, Toronto, 126 Seaton st. D.L.S., City Surveyor.	12th April, 1852
Ure, Frederick John, Woodstock D.L.S.	7th April, 1887
VAN NOSTRAND, ARTHUR J., Toronto, 703 Temple Building President Association of O. L. Surveyors, D.L.S.	30th Oct., 1882
Waddell, William Henry, Hamilton. D.L.S.	May, 1905
Wadsworth, Vernon Bayley, Toronto, 103 Bay st. D.L.S.	9th April, 1864
Walker, Alfred Paverley, Toronto, Room 508, Union Station, C. P. Ry., Eng. Office D.L.S., Mem. Can. Soc. C.E.	6th Jan., 1882
Wallace, James Nevin, Calgary, Alta. D.L.S., B.A., B.E. (Trin. Coll., Dublin).	21st Feb., 1898
Ward, Archeson Thomas, Toronto, 703 Temple Building	10th April, 1897
Warren, James, Walkerton, P.O. Box 190 D.L.S.	7th Oct., 1864
Watson, John McCormack, Orillia, P.O. Box 224	13th April, 1892

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Wells, Arthur Frederick, Sandwich.	17th Feb., 1906
Wetherald, Thomas, Goderich, P.O. Box 273 D.L.S., C.E.	12th Jan., 1856
Weekes, Abel Seneca, Glencoe D.L.S.	12th April, 1890
Weekes, Melville Bell, Brantford B.A.Sc. (Toronto Univ.), D.L.S.	17th Feb., 1900
West, Robert Francis, Orangeville	7th April, 1881
Wheelock, Charles Richard, Orangeville Treasurer County of Dufferin.	7th Jan., 1886
Whitson, James Francis, Toronto, Dept. of Lands, Forests and Mines	9th Jan., 1886
Wiggins, Thos. Henry, Finch, Ont. Grad. S.P.S.	10th Nov. 1891
Wilde, John Absalom, Sault Ste. Marie	9th April, 18
Wilkie, Edward Thomson, Carleton Place D.L.S.	11th April, 1891
Wilkins, Frederick William, Norwood, Ont. D.T.S.	6th Jan., 1877
Williams, David, Port Arthur. D.L.S.	9th April, 1864
*Winter, Henry, Thornyhurst D.L.S., C.E.	11th July, 1853
*Wood, Henry O., Billings Bridge	10th Oct., 1855
*Yarnold, William Edward, Port Perry, P.O. Box 44 D.L.S.	7th April, 1854

REGISTERED AND WITHDRAWN.

The names of those who have become "Associates" under By-law No. 39 are marked *; and under By-law No. 45 are marked †.

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Anderson, John Drummond, Trail, B.C.	13th April, 1892
Anderson, William Beaumont, Ottawa, 178 Cartier st. Grad. R.M.C., B.A.Sc. (McGill), M. Can. Soc. C.E., D.L.S.	14th Feb., 1903
Apsey, John Fletcher, Cumberland, Md. Grad. S.P.S.	6th Jan., 1886
Aylsworth, Charles Fraser, Sr., Madoc D.L.S.	2nd April, 1861
Bowman, Arthur Meyer, Mahan, Beaver Co., Pa. Grad. S.P.S., Staff of U. S. Engineers.	11th Nov., 1887
Bowman, Franklin Meyer, Bellevue, Allegheny Co., Pa. Grad. S.P.S., Engineer Structural Iron Works.	11th April, 1892
Brady, James, Victoria, B.C., P.O. Box 815 M.E.	15th July, 1862
Burnet, Hugh, Victoria, B.C. D.L.S., P.L.S. (B.C.).	5th April, 1887
Cambie, Henry John, Vancouver, B.C. D.L.S., P.L.S. (B.C.).	8th July, 1861
Carbert, J. Alfred, Medicine Hat, Assa. Dist. Eng. and Surveyor.	7th April, 1876
Carpenter, Henry Stanley, Collingwood D.L.S., B.A.Sc., Toronto.	25th Feb., 1899
*Charlesworth, Lionel Clare, Edmonton, Alta. Grad. S.P.S., Director of Surveys, Saskatchewan, D.L.S.	14th April, 1896
Coleman, Richard Herbert, Toronto, Can. Co. Offices, Imperial Bank Chambers	6th Oct., 1877

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Drewry, William Stewart, Ottawa, Dept. of the Interior D.L.S.	5th April, 1883
Ducker, William A., Winnipeg, Man. D.L.S., P.L.S. (Man.), Swamp Lands Comm'r.	6th April, 1882
Edwards, George, Thurso, P.Q. D.L.S.	6th Jan., 1866
*Ellis, Henry Disney, Kuching, Sarawak, Borneo D.L.S., Commissioner of Pub. Works and Surveys.	7th April, 1877
Galbraith, John, Toronto, School of Prac. Science M.A., D.L.S., Prof. Engineering S.P.S.	13th April, 1875
Gibbons, James, Ottawa, Dept. of the Int. Grad. S.P.S., Dominion Topographical Surveyor.	15th April, 1890
Gibson, George, St. Catharines D.L.S.	10th April, 1860
Gibson, Harold Holmes, Jackson, Kentucky	8th Sept., 1891
*Harris, John Walter, Winnipeg, Man. P.L.S. (Man.), D.L.S., Assessment Com.	6th Oct., 1866
*Harvey, Thomas Alexander, 239 Vernon ave., Long Island, N. Y. City	13th Nov., 1893
Henderson, Eder Eli, Henderson P.O., Maine Grad. S.P.S.	7th April, 1887
Hermon, Ernest Bolton, Vancouver, B.C. P.L.S. (B.C.), D.L.S.	7th Oct., 1885
Innes, William Livingstone, Simcoe C.E. (Toronto Univ.).	14th April, 1892
Jephson, Richard Jermy, Winnipeg, Man. P.L.S. (B.C.), D.L.S.	7th April, 1877
Johnson, Sydney Munnings, Greenwood, B.C.	9th Nov., 1895
Johnston, Robert Thornton, The Riviera, 142 st. and 7th ave., N. Y. City	9th April, 1899
Kennedy, James Henry, Keremeos, B.C. C. E. (Toronto Univ.), Chief Engineer V. V. & E. R., & N. Co.	7th April, 1887
*Kippax, Hargreaves, Huron, South Dakota C.E. (Toronto Univ.), Assistant to Surveyor-General.	7th July, 1877

NAME AND P.O. ADDRESS. DATE OF ADMISSION BY BOARD.

Kirk, John Albert, Revelstoke, B.C..........6th July, 1877
D.L.S., P.L.S. (B.C.).

Klotz, Otto, 437 Albert st., Ottawa..........6th Jan., 1867
Dom. Top. Surveyor, C.E. (Mich. Univ.), LL.D.

Lane, Andrew, Sparrow's Point, Md.......4th April, 1895
Grad. S.P.S., Draftsman Maryland Steel Co.

Lendrum, Robert Watt, Strathcona, Alta....8th Jan., 1874
D.L.S.

Livingstone, Thomas Chisholm,
(address not known) ....10th Jan., 1859
D.L.S.

MacLeod, Henry Augustus F., Ottawa,
340 Cooper st. ....11th Oct., 1856
D.L.S., C.E.

MacPherson, Duncan, Montreal ....9th Jan., 1884
Grad. R.M.C., M.I.C.E., Mem. Can. Soc. C.E., Div. Eng. East Div. C.P.R., D.L.S.

McCulloch, Andrew, Lake Nelson, B.C............
Grad. S.P.S., Assoc. Mem. Can. Soc. C.E., City Engineer.

McLennan, Roderick, Toronto ....20th Jan., 1846

Magrath, Charles Alexander, Lethbridge, Alta. 1st Nov., 1881
B.A.Sc. (McGill), D.L.S., P.L.S. (B.C.).

Marshall, James, Blyth. ....6th Oct., 1866
D.L.S.

Meadows, William Walter, Windsor.........21st Feb., 1898
D.L.S., Grad. S.P.S.

Miles, Charles Falconer, 268 Triangle st.,
Buffalo, N.Y. ....13th Jan., 1862

Moore, Thos. Alexander, London South....12th Nov., 1892

Munro, John Vicar, New York, N.Y.,
359 West 31st st. ....9th April, 1895

†Paterson, James Allison. ....5th April, 1878
C.E., Mem. Can. Soc. C.E.

Pearce, William, Calgary, Alta............12th Oct., 1872
D.L.S., P.L.S. (B.C.), Asst. B.C. Land Commissioner for C.P.R.

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Peterson, Peter Alexander, Montreal, P.Q. D.L.S., C.E. (Toronto Univ.)	16th July, 1863
Ponton, Archibald William, Macleod, Alta. D.L.S.	9th April, 1880
Purvis, Frank, Mesa City, Arizona	7th April, 1875
Reid, John Lestock, Prince Albert, Sask. D.L.S.	8th April, 1870
Reiffenstein, James Henry, Ottawa, Dept. of the Interior D.L.S.	16th April, 1873
Reilly, William Robinson, London, 361 Simcoe st. D.L.S., P.L.S. (Man.).	7th April, 1881
Reynolds, Samuel Henry, Winnipeg	17th July, 1880
Ritchie, Nelson Thomas, Kipiegan, Man. P.L.S. (Man.)	9th Nov., 1888
Robinson, Franklin Joseph, Regina Grad. S.P.S., D.L.S., Dep. Min. Pub. Works.	21st Feb., 1898
*Ross, Joseph Edmund, New Westminster, B.C. D.L.S., P.L.S. (B.C.).	11th Nov., 1890
Sanderson, Daniel Leavens, Coral, Mich.	4th Oct., 1882
Saunders, Bryce Johnston, Edmonton, Alta B.A.Sc. (McGill), D.L.S.	7th Jan., 1885
Shaw, Charles Aeneas, Greenwood, B.C. P.L.S. (B.C.).	6th Oct., 1877
Sherman, Ruyter Stinson, Mission City, B.C. P.L.S. (B.C.).	12th April, 1890
Smith, Henry, Toronto, Dept. of Lands, Forests and Mines D.L.S., Mem. Can. Soc. C.E.	8th Nov., 1861
Stewart, Elihu, Ottawa, Dept. of Interior D.L.S., Chief Inspector of Forestry.	8th April, 1872
*Stewart, Louis Beaufort, Toronto, School of Prac. Science Dom. Top. Surveyor, Professor of Surveying.	6th April, 1882
Tracey, Thomas Henry, Vancouver, B.C. C.E., P.L.S. (B.C.), D.L.S.	8th April, 1870

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Vicars, John Richard Odlum, Kamloops, B.C. P.L.S. (B.C.), D.L.S.	5th Jan., 1887
Wallace, Charles Hugh, 36 Dame st., Dublin, Ireland C.E. (Trin. Coll., Dublin), Dom. Top. Surveyor.	9th Nov., 1889
Wheeler, Arthur Oliver, Calgary, Alta P.L.S. (B.C.), D.L.S., Topographer, Dept. of Interior.	8th July, 1881
Wicksteed, Henry King, Cobourg D.L.S., C.E.	7th Jan., 1886

SUMMARY.

Active members subject to dues	228
Active members exempted from dues	17
Withdrawn from practice (including nine Associates)	70
Dead	67
Total number enrolled since incorporation	382

DECEASED MEMBERS.

NAME.	LATE RESIDENCE.	DATE OF P.L.S. CERTIFICATE.	DATE OF O.L.S. REGISTRATION.	DIED.
Abrey, George Brockitt	Toronto Junction	10th January, 1860	1892	25th June, 1906.
Barrett, Russell H	Pembroke		14th February, 1903	30th January, 1905.
Bigger, Samuel Howell	Ottawa		30th January, 1904	7th July, 1906.
Bolger, Francis	Lindsay	10th October, 1863	1892	3rd November, 1895.
Bolger, Thomas Oliver	Kingston	6th July, 1865	1892	—— ——
Bolton, Jesse Nunn	Toronto	6th April, 1867		—— ——, 1901.
Bowman, Leander Meyer	Toronto	14th April, 1892	1892	20th September, 1895.
Brown, David Rose	Cornwall	10th October, 1850	1892	14th May, 1900.
Burke, William Robert	Ingersoll	5th April, 1878	1892	10th June, 1897.
Caddy, Cyprian F.	Campbellford	10th July, 1860	1892	—— August, 1905.
Caddy, Edward C.	Cobourg	18th December, 1846	1892	26th September, 1897.
Cheeseman, Thos.	Mitchell	11th July, 1856	1892	—— ——, 1905.
Coad, Richard	Glencoe	8th October, 1879	1882	17th May, 1897.
Creswicke, Henry	Barrie	8th July, 1864	1892	22nd January, 1898.
Cromwell, Joseph M. O.	Perth	1st October, 1846	1892	19th October, 1897.
Davidson, Walter Stanley	Sarnia	9th April, 1884	1882	December, 1900.
Davis, John	Alton	5th April, 1878	1892	8th November, 1907.
Deane, Michael	Windsor	26th May, 1848	19th December, 1882	3rd April, 1897.
DeGurse, Joseph	Windsor	5th April, 1883	1892	22nd March, 1898.
Dobbie, Thos. Wm.	Tilsonburg	11th July, 1856	1892	—— ——, 1908.
Filmore, Stanley H.	St. Thomas		17th February, 1902	16th June, 1904.
FitzGerald, James William	Peterborough	13th July, 1857	1892	————, 1901.
Foster, Frederick Lucas	Toronto	9th April, 1863	1892	27th July, 1899.
Fowlie, Albert	Orillia	13th January, 1863	1892	—— April, 1898.
Fraser, Charles	Wallaceburg	5th August, 1847		—— ——, 1905.
Gibbs, Thomas Fraser	Adolphustown	31st May, 1841	1892	17th April, 1893.
Gilliland, Thomas Brown	Eugenia	11th July, 1868	25th January, 1890	14th December, 1898.
Gilmour, Robert	Toronto	11th April, 1856	1892	29th December, 1903.
Hanning, Clement George	Preston	19th July, 1858	1892	7th May, 1905.
Haskins, William	Hamilton	5th July, 1855	1892	5th July, 1896.

Hermon, Royal Wilkinson	Rednersville	13th July, 1857	1892	9th February, 1907.
Hewson, Thomas Ringwood	Hamilton	6th July, 1877	1892	21st October, 1898.
Howitt, Alfred	Gourock	12th January, 1856	1892	6th May, 1896.
Kains, Tom	Victoria	11th July, 1873		—— ——, 1901.
Kirk, Joseph Green	Stratford	16th February, 1843	1892	22nd January, 1900.
Lynch-Staunton, Francis H.	Hamilton	11th October, 1856	1892	11th June, 1899.
Macdougall, Allan Hay	Port Arthur	4th April, 1859	1892	—— February, 1906.
MacMillan, James Alexander	Calgary	6th January, 1877	24th December, 1894.	—— ——. 1898.
MacNab, John Chisholm	Hamilton	8th January, 1880	1894	16th October, 1897
McAree, John	Toronto	6th April, 1867	1894	12th December, 1903.
McCallum, James	Fort Francis	30th March, 1849	1894	—— July, 1900.
McGeorge, Wm. Graham	Chatham	8th January, 1866	1892	1st July, 1906.
McLatchie, John	Nelson, B. C.	9th January, 1864	1892	3rd February, 1908.
Malcolm, Sherman Morgan	Blenheim	11th October, 1858	1894	13th January, 1899.
Ogilvie, John Henry	Rat Portage	8th April, 1876	24th April, 1894	21st September, 1898.
Pedder, James Robert	Doon	10th November, 1891.	23rd December, 1892.	17th January, 1897.
Pope, Robert Tyndal	Ireland	13th April, 1875		—— ——, 1905.
Proudfoot, Hart William	Saskatoon, Assa.	6th May, 1905		31st March, 1906.
Reid, James Hales	Bowmanville	6th October, 1866	1892	22nd December, 1899.
Robinson, William	London	—— May, 1846	1892	11th October, 1894.
Rubidge, Tom S.	Cornwall	9th February, 1849	1892	—— June, 1904.
Sankey, Villiers	Toronto		1892	10th July, 1905.
Schofield, Milton C.	Guelph	28th September, 1843.	1892	19th February, 1908.
Simpson, George Albert.	Winnipeg	7th October, 1864	1892	8th January, 1905.
Spry, W.				—— ——, 1906.
Squire, Richard Herbert	Brantford	14th April, 1896	1896	—— ——, 1908.
Steele, Edward Chas.	Sault Ste. Marie	9th April, 1889	1892	—— ——, 1908.
Strange, Henry	Rockwood	30th November, 1838.	1892	March, 1908.
Strathern, John	B.C.	5th October, 1876	1892	—— ——, 1897.
Tiernan, Joseph Martin	Tilbury Centre	7th January, 1886	1892	—— December, 1900.
Thomson, Augustus Clifford	Chicago	14th January, 1861	1892	—— December, 1896.
Van Buskirk, William Fraser	Stratford	7th April, 1883	1892	30th January, 1905.
Wagner, William	Ossowo	13th April, 1858		—— ——, 1901.
Walsh, Thomas William	Simcoe	25th April, 1842	1892	14th March, 1895.
Wheelock, Charles John	Orangeville	—— ——, 1856	1892	4th July, 1897.
Willson, Alfred				20th May, 1906.

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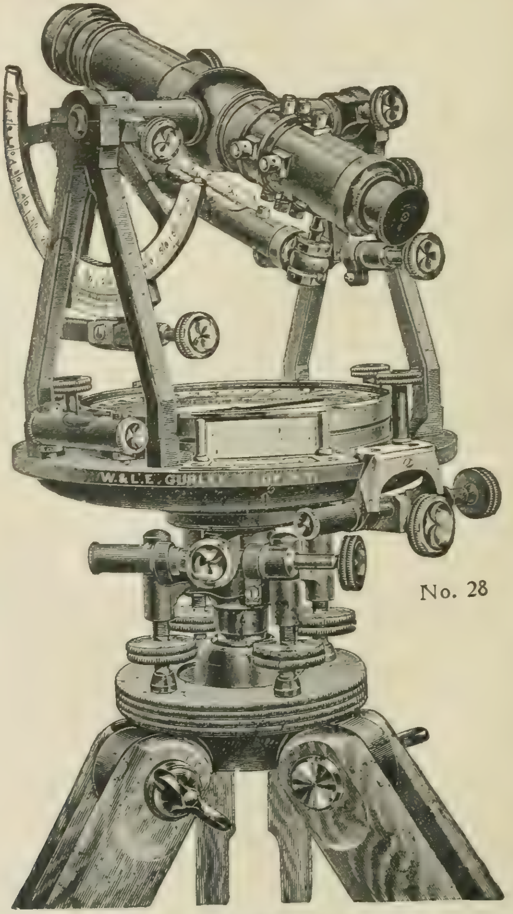

No. 28

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NO. 24.

ANNUAL REPORT

OF THE

Association of OntarioLandSurveyors

ORGANIZED 1886 INCORPORATED 1892

AND

PROCEEDINGS

AT THE

SEVENTEENTH ANNUAL MEETING SINCE INCORPORATION

HELD AT

TORONTO

FEBRUARY 23rd, 24th and 25th, 1909.

Printed for the Association by
THE STEVENSON PRINTING CO.,
184 Adelaide St. West,
Toronto.

Patronize Our Advertisers.

NOTICES.

MEMBERS and others will be supplied with copies of the Annual Reports for 1886, 1887, [illegible] 1891, 1892, 1893, 1894, 1895, 1896 1897, 1898, 1899, 1900, [illegible] 1903, 1904, 1905, 1906, 1907, 1908 or 1909 upon remitting to the Secretary fifty cents for each copy required.

Each member of the Association is reminded of the fact that for the next Annual Meeting a good programme is most desirable, and to ensure its preparation it is not now too early to bear the matter in mind.

In addition to its use as a library, the Repository now serves as a drafting room for members when copying Crown Lands plans and notes.

Published annually by the Association of Ontario Land Surveyors. Edition, 1350 copies; price, 50 cents.

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PREFACE.

To the Members of the Association of Ontario Land Surveyors.

The Proceedings of the Association at its Seventeenth Annual Meeting are herewith presented.

Respectfully submitted on behalf of the Council,

KILLALY GAMBLE,

Secretary.

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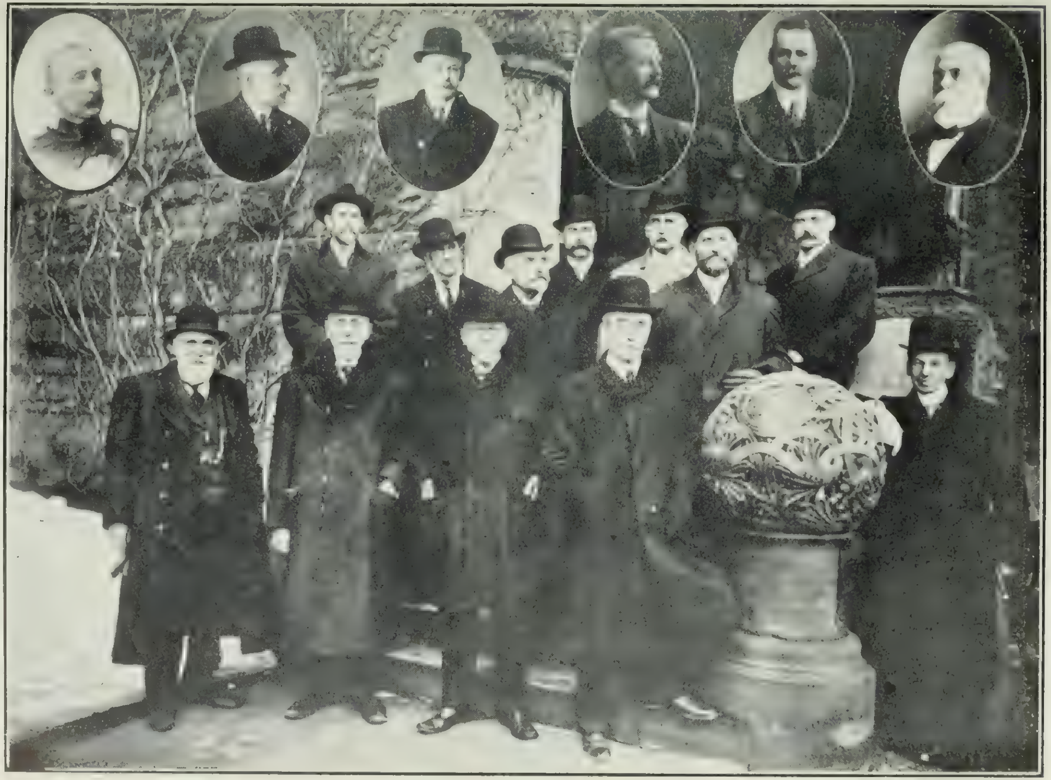
PAST PRESIDENTS.

Villiers Sankey, H. J. Bowman, Maurice Gaviller, M. J. Butler, T. Harry Jones, W. R. Aylesworth,
1890—1892. 1899—1900. 1895—1896. 1894—1895. 1897—1898. 1902—1904.



George Ross, P. S. Gibson, Otto Klotz, J. W. Tyrrell, C. A. Jones, Thos. Fawcett, A. J. Van Nostrand,
1900—1901. 1898—1899. 1906—1907. 1905—1906. 1904—1905. 1907—1908. 1908—1909.

James Dickson, E. Stewart, A. Niven, G. B. Kirkpatrick, Willis Chipman,
1901—1902. 1892—1894. 1888—1890. 1886—1888. 1896—1897.

ASSOCIATION OF

ONTARIO LAND SURVEYORS

(INCORPORATED 1892.)

Organized 23rd February, 1886.

OFFICERS FOR 1909-10.

PRESIDENT.

Lewis Bolton - - - - - Listowel.

VICE-PRESIDENT.

H. W. Selby - - - - - Toronto.

CHAIRMAN OF COUNCIL.

G. B. Kirkpatrick - - - - Toronto.

SECRETARY-TREASURER.

Killaly Gamble - - - - - Toronto.

MEMBERS OF COUNCIL.

Hon. Frank Cochrane, Commissioner Lands, Forests and Mines.

Alex. Niven, Haliburton,
H. J. Beatty, Eganville. } For Term Ending April, 1912.

G. B. Kirkpatrick, Toronto,
J. F. Whitson, Toronto. } For Term Ending April, 1911.

P. S. Gibson, Willowdale,
C. J. Murphy, Toronto. } For Term Ending April, 1910.

AUDITORS.

E. T. Wilkie - - - - Carleton Place.
A. T. Ward - - - - - Toronto.

BANKERS.

Imperial Bank of Canada (Yonge St. Branch). - Toronto.

BOARD OF EXAMINERS.

G. B. Kirkpatrick (Chairman).

Thos. Fawcett, Niagara Falls,	For 3 years
T. B. Speight, Toronto.	
G. B. Kirkpatrick, Toronto,	For 2 years
Owen McKay, Walkerville.	
P. S. Gibson, Willowdale,	For 1 year
Alex. Niven, Haliburton.	

Killaly Gamble (Secretary of Board).

Note.—Board meets at Department of Lands, Forests and Mines, Parliament Buildings, Monday, 7th February, 1910.

COMMITTEES, 1909-1910.

STANDING.

LAND SURVEYING—A. J. Van Nostrand (Chairman), P. S. Gibson, A. Niven, J. Dickson, F. W. Wilkins, C. E. Fitton, T. B. Speight, H. J. Beatty, L. V. Rorke.

DRAINAGE—Geo. Ross (Chairman), C. A. Jones, J. J. Newman, A. S. Code, J. H. Moore, R. McDowall, S. B. Code.

ENGINEERING—J. Hutcheon (Chairman), E. B. Barrow, Owen McKay, J. D. Evans, T. H. Jones, L. V. Rorke, A. P. Walker, W. E. McMullen, W. M. Davis.

TOPOGRAPHICAL SURVEY—T. Fawcett (Chairman), B. J. Saunders, L. B. Stewart, J. L. Morris, C. C. Fairchild, J. N. Wallace, R. H. Montgomery.

ENTERTAINMENT—J. F. Whitson (Chairman), A. J. Van Nostrand, H. L. Esten, Killaly Gamble, W. A. McLean.

PUBLICATION—Killaly Gamble (Chairman), H. L. Esten, A. J. VanNostrand, J. F. Whitson, W. A. McLean, D. D. James, H. de Q. Sewell.

SPECIAL.

LEGISLATION—G. B. Kirkpatrick (Chairman), Jas. Dickson, J. W. Fitzgerald, M. Gaviller, P. S. Gibson, C. A. Jones, A. Niven, Jas. Robertson, T. B. Speight, E. T. Wilkie.

REPOSITORY AND BIOGRAPHY—H. L. Esten (Chairman), C. Unwin, G. B. Kirkpatrick, J. F. Whitson, A. J. Van Nostrand, Killaly Gamble.

EXPLORATION—H. W. Selby (Chairman), J. W. Tyrrell, L. V. Rorke, T. B. Speight, H. B. Proudfoot, W. W. Stull, A. T. Ward.

POLAR RESEARCH—Willis Chipman (Chairman), L. B. Stewart, O. J. Klotz, Thos. Fawcett, J. W. Tyrrell, J. F. Whitson, J. L. Morris.

PROGRAMME OF THE

Association of Ontario Land Surveyors

(INCORPORATED)

AT ITS SEVENTEENTH ANNUAL MEETING HELD AT TORONTO,
FEBRUARY 23rd, 24th and 25th, 1909.

PROGRAMME

Tuesday, 23rd February—Morning, 10 o'clock.

IN THE PARLIAMENT BUILDINGS.

Meeting of Council of Management.
Meeting of Standing and Special Committees.

Afternoon, 2 o'clock.

Reading of Minutes of Previous Meeting.	
Correspondence.	
President's Address.	A. J. Van Nostrand
Report of Council of Management.	
Report of Secretary-Treasurer, (including Financial Statement).	
Report of Board of Examiners.	G. B. Kirkpatrick, Chairman
Report of Committee on Publication.	Killaly Gamble, Chairman
Report of Committee on Topographical Survey,	T. Fawcett, Chairman
Paper—"The Mill Lot, Township of Plantagenet."	E. T. Wilkie

Evening, 8 o'clock.

LECTURE by Elihu Stewart, at Engineers' Club, 96 King St. West—"Down the Mackenzie River and up the Yukon," Illustrated.

Wednesday, 24th February—Morning, 10 o'clock.

IN THE PARLIAMENT BUILDINGS.

Report of Committee on Land Surveying.	J. McC. Watson, Chairman
Report of Committee on Repository and Biography,	H. L. Esten, Chairman
Report of Committee on Engineering.	Owen McKay, Chairman
Paper—"The Sizes, Materials, and Shapes of Sewers in the City of Hamilton"	F. G. Barrow
Paper—"Hudson Bay a National Asset,"	J. W. Tyrrell
Paper—"The Road Surface,"	W. A. McLean
Report of Committee on Drainage.	J. J. Newman, Chairman
Paper—"Local Improvements."	George Ross
Paper—"The Seigniory of Longueuil."	E. T. Wilkie

Afternoon, 2 o'clock.

Report of Committee on Exploration,	H. W. Selby, Chairman
Paper—"The Future of Surveyors in Northern Ontario."	J. F. Whitson
Paper—"Equipment and Management of a Party on Township Outlines,"	T. B. Speight
Paper—"Gravity,"	Otto Klotz
Report of Committee on Legislation,	G. B. Kirkpatrick
Discussion on Tables for Determining Azimuth by the Polar Star.	Opened by L. B. Stewart
Paper—Drainage.	A. S. Code

Thursday, 25th February—Morning, 10 o'clock.

IN THE PARLIAMENT BUILDINGS.

Paper—Notes on Iron Ore Mining, Bell Island, Newfoundland,	W. B. Ford
Report of Auditors.	
Report of Committee on Polar Research.	Willis Chipman, Chairman
Report of Committee on Entertainment.	L. V. Rorke, Chairman

Nomination of Officers—President, Vice-President, Secretary-Treasurer, Auditors, two Members of Council.

Unfinished Business.

New Business.

Adjournment.

Mahlon Burwell

(From an Oil Painting)

COLONEL MAHLON BURWELL,

LAND SURVEYOR.

BY ARCHIBALD BLUE,

Director of Bureau of Mines, Toronto

I have read all the letters and journals of Mahlon Burwell to be found on the shelves and in the vaults of the Surveys office of the Crown Lands Department, and if in the use of them I were to follow the example of Carlyle in his Oliver Cromwell, I would make a large book. But Burwell has been dead only a little more than fifty years, and his journals and letters have not yet attained a richness of age, not even those of ninety years ago. The paper is but slightly yellowed, the ink is but faintly faded, and the penmanship is neat and flowing. I was going to say that they are as legible as if written yesterday, but that would be an odious comparison in view of the fact that in our time and in our own city good writing, like spelling and reading, has gone out of fashion, if it has not become a lost art. By the end of the twentieth century the old records of the Crown Lands Department will begin to have value, and if the Burwell papers are preserved until then some writer on Canada in the Nineteenth Century will find them out and make them live again in history. But will they be preserved ? A few of the letters and more than one-half of the journals are already missing from their place, as a consequence, I have no doubt, of a lack of motive to keep the records of the office complete, and of the frequent movings of the seat of Government during the years of the Union of Upper and Lower Canada – to Kingston, to Montreal, to Toronto, to Quebec and to Ottawa.

I am to write of Mahlon Burwell as a Land Surveyor, and therefore I shall say little upon other matters in which as a man active in affairs he took some part. The letters and journals, indeed, deal closely with the business he had in hand, and only at rare intervals is there a gleam of personal or human interest to lighten up the official soberness. I shall make two or three lengthy quotations from the official instructions and from the journals, to illustrate the methods of ninety years ago, and how difficulties were faced, and how work was done as the methods required. Those were days of military ideas in Canada, and men of the Civil

Service, outside as well as inside, discharged their duties with the courage and precision begotten of military discipline. They were not all exemplary men in the highest ranks. Some took advantage of their opportunities, seeking especially to enrich themselves by securing valuable tracts of the public lands either as gifts from the Crown's representative whose favorites they were, or by paying for them at a nominal price ; and the Crown's representative himself was not always a man above suspicion. But in the case of Mahlon Burwell I have not discovered the suggestion of an improper act. He appears throughout all the papers and letters as a modest, faithful servant, and as a dignified and highminded man.

It has been said of Queen Victoria that she reigns but does not govern. This could not be said of the Governors of Canada in the days before responsible government, when George the Third was King. Francis Gore, who was Governor of Upper Canada from 1808 to 1816, was every inch a Governor, and the administration of the country was in his hands down almost to the smallest detail. He kept a watchful eye upon the public domain, and, following the good example set by Simcoe, he sought diligently to promote its settlement.

In May, 1803, Col. Thomas Talbot commenced the settlement known by his name on the shores of Lake Erie, in what is now Elgin county. Next year an expenditure of £250 currency was made under his direction in building a road through his lands. When Gore became Governor a memorial was addressed to him by Talbot, praying for a plan of settlement, similar to the one adopted in the formation of Yonge street, which in Talbot's opinion would result in completing the road to the full extent of the first intention. The matter was referred to the Executive Council, who reported to the Governor that the district to be served by the proposed road was very thinly inhabited, that in no other part of the Province was the want of facility of intercourse more sensibly felt and experienced, and that the money already expended would be entirely lost to the public if the design of continuing the road was frustrated. Besides, it was felt that a highway extending through the country and occupied by a good class of settlers would add to the value of the large adjoining block of land which had been set apart in Southwold, Yarmouth and Houghton, as the source of a fund for public schools. It was therefore advised that a grant of lots of 200 acres should be made to persons willing to become settlers on each side of the projected road, subject to these conditions, viz.: (1) That within two years from the time each settler was permitted to occupy a lot he should build thereon a good and sufficient dwelling house of at least 15 by 20 feet in the clear, and occupy it in person or by a substantial tenant. (2) That within the same time he should clear and fence ten acres, and clear and open up one-half of the width of road in front of his lot, and cut down all trees within a hundred feet of the road. But as the lots proposed to be granted under this scheme were parts of the lands set apart for public schools, it was recommended that land of equal extent and value should be appropriated elsewhere for the same object.

The office of Surveyor General was vacant at this time, and was occupied by Messrs. Chewett and Ridout as acting Surveyors General.* They were commanded by the Lieutenant-Governor—his orders were always in the form of commands—to send a surveying party into the London District to survey and lay out the new road, and upon the recommendation of Col. Talbot the post of surveyor was offered to Mahlon Burwell, being his first commission from the Government. The instructions, under date of March 24th, 1809, were in the following terms:

"In obedience to His Excellency, the Lieutenant-Governor's commands to us, bearing date the 17th February, 1809, to send a surveyor and a sufficient party, as soon as the season will permit, to complete certain surveys in the London District recommended by the Executive Council and approved by His Excellency the Lieutenant-Governor, upon a petition submitted to the Board from Thomas Talbot, Esq., of Port Talbot, who has recommended you to carry the said survey into execution.

"You are hereby required and directed without loss of time, as soon as the season will permit, to survey and lay out a road to pass through the aforesaid townships upon the principle of Yonge street, by making the said road in breadth one Gunther's chain, and laying out lots thereon of twenty chains in breadth on each side of the same, leaving a road on the side lines of each of the said townships, and a road between every five lots in each of the same, of one Gunther's chain.

*December 26th, 1810, Secretary William Halton was commanded by the Lieutenant Governor to inform Thomas Ridout, Esquire, Surveyor General, that he had been pleased to appoint William Chewett, Esquire, to be first clerk in the Surveyor General's office from the first of July last, in the room of Mr. Ridout himself, promoted to the office of Surveyor General from the same date. Mr. Ridout held the place about eighteen years, and again Mr Chewett became acting Surveyor General, but he never attained the full rank

"For this survey your pay will be 7s. 6d. per day, with an allowance in lieu of rations of 1s. 3d. Provincial currency per day.

"Your party is to consist of eight men, that is to say, two chainbearers and six axe men only, considering the country through which you have to pass is lightly wooded, by having little or no underbrush.

"The chainbearers will be allowed 2s. per man per day. The axemen will be allowed 1s. 6d. per man per day, all Provincial currency, and you will be allowed for each ration furnished to your party 1s. 3d. Provincial currency per man per day.

"The ration to be of the following species, viz., 1½ ℔. flour, ¾ ℔. of pork and ½ pint of peas.

"You are to understand that this allowance to you of 1s. 3d. Provincial currency per man per day for each ration is to cover all expenses whatsoever, such as transport, batteau hire, camp kettles, axes, tommyhawks, tents, bags, snowshoes, etc.

"The chainbearers must be sworn to the faithful discharge of their trust before they enter upon their operation. This you are authorized to do yourself, under an Act of the Province of Quebec, no law in the Province of Upper Canada having been made to the contrary; but it will appear more solemn and have a better effect to have it performed by a magistrate.

"The whole of your party, being eight in number, are actually to be employed in the field without any subterfuge, as you will be obliged to make oath to this fact. But should you not be able to engage the whole of your party—that is to say, eight men, including axemen and chainbearers—you are to bear no more men on your pay list than those who are actually employed in the field.

"Should you be under the necessity of discharging any of your party before the survey is completed, you must keep four open pay lists for that purpose, which the person so discharged must sign, whose signature must be witnessed by some person of respectability (if possible), and those who remain with you are also to be borne on the said pay list, a form of which is herewith enclosed for your guidance, so that the whole of the expense incurred on your survey shall not exceed the number of men your party is rated at, which must be sworn to according to the form given.

"You must keep a field book of the whole of your operation, noting everything worthy of remark, but in particular the white and yellow pine, and the lots on which it is to be found, which must be so clear and distinct that the whole thereof may be traced on the plan, not only by a surveyor but by any person who can read writing, which must also be sworn to and returned with your pay lists and vouchers.

"You must keep a diary or journal, clearly explicit, as how you have expended your time, in which you must enter everything worthy of remark, particularly the white and yellow pine fit or not fit for masting, according to the best of your knowledge and belief, and such mines and minerals, etc., that you may pass in the course of your operation, noting the lot and concession whereon the same may be found, as directed in your field book, and you must be particularly careful in your diary or journal to enter the time and names of the persons whom you engage and discharge, according to their respective dates, so that the same may correspond with your pay list, which also must be sworn to and returned with your vouchers.

"Your pay list and vouchers for your pay, ration and abstract must be in quadruplicate.

"The rough plans of Yarmouth, Southwold and Houghton, herewith sent to assist you in your operation, on which are laid down imaginary lines upon which the courses of the road are supposed to run, the situation of which must be determined by measuring on the side lines of the several townships from Lake Erie, until you intersect the road you are to lay out, when it is completed, which must be returned with the fair plans of your operation, on which must be laid down in a clear and distinct manner the mountains, hills, rivers, marshes, meadows and swamps, or whatever else may occur that may be remarkable for its singularity or utility.

"The principle on which Yonge street is laid out is, that the lots are 20 chains in front by 100 chains in depth; therefore it is requisite to observe that whatever obliquity you may have occasion to make from the concession lines of those townships hereafter to be run, making Yarmouth as the centre township the governing one for the three townships, then you will have to calculate the obliquity of the same on the angle or difference deviating from the concession lines of the township of Yarmouth, which Mr. Chewett will explain, and show you the method of calculating should you be unacquainted the nature thereof. The plans of Southwold, Yarmouth and Houghton, sent with these instructions, will point out how far this can be carried into execution.

"You must always have in remembrance that you cannot approach nearer to Lake Erie with the rear boundary forming the concession on the road to be laid out than the rear boundary of the 7th concession of Yarmouth, nor the rear boundary line of the 4th concession in Southwold from the river Thames, which have been so far conceded.

"You must not, however, set out to commence your operation until such time as you have reason to believe that the waters have sufficiently left the woods, that there may be no plea of delay by being obliged to hire your party and to commence your operation at an unseasonable time of the year.

"A reasonable time when you arrive at Port Talbot will be given to you for the hire of your party and purchasing your provision, which it is supposed may be done at one and the same time, and also for going to and coming from your place of residence to Port Talbot, and for making up your plans and vouchers, and no more, and every exertion that a surveyor is capable of in carrying the same into execution with accuracy and dispatch is expected from you."

A party of surveyors usually consists of ten men besides the chief, but as the woods in the west were supposed to be more open than elsewhere, Mr. Burwell concluded that he could effect the work with eight men, and so that number was placed in the instructions. He apprehended, however, that men could not be hired at the Government rate of wages, as they were accustomed to receive more from the farmers. Accordingly the Governor in approving the instructions agreed that "should it be impossible to procure men to assist the surveyor at the usual price, Col. Talbot must be requested to certify the lowest wages they are to be had for, which will be allowed upon this location." The regular rate continued without alteration for a long period. In 1797 it was the same as in 1809, but in 1815, after the close of the war, rates were increased, owing to the higher cost of living. "The notice you have taken of the prices of labor and provisions having risen within the last three or four years is very cogent," Mr. Burwell wrote to Mr. Ridout from Southwold, in November, 1815. "Provisions are dear here and Labor is high, which I expect is pretty generally the case throughout the Province. Farmers are giving from fifteen to eighteen dollars per month to laborers, which will make it difficult, if at all practicable in the present state of affairs, to execute the Surveys required at the former established rates. As to myself, I must confess that it is an arduous undertaking to be in the Wilderness exposed to the inclemencies of the weather long at a time. It certainly impairs one's health. An increase of pay is desirable—but it would be indecorous for me to state my humble opinion of what it ought to be. The circumstances which lead you to mention it are sufficiently known to yourself as Surveyor-General, and I shall be content with such additional pay as the Lieutenant Governor in Council shall deem expedient to establish." The scale was made 10s. currency per day for surveyors, 3s. 9d. for chainmen and 2s. 6d. for axemen, with the usual allowance for rations. In 1818 a new scheme was introduced. Surveys of townships were let under contract, and payment was made in a percentage of the lands. The common allowance was 4½ per cent., but if the land of a township was shown to be marshy or the quality of it poor, the percentage might be drawn from lands elsewhere.

Economy was enjoined upon all surveyors, and the records show that it was rigidly exacted. "You will pay the strictest attention to the economy of your time," Surveyor General Smith advised Abraham Iredell in 1803, "as the most minute scrutiny will be made in respect of the same." There was an audit of the accounts in Toronto, and afterwards an audit in London before they were finally passed, and for this reason all accounts and vouchers were required to be made out in quadruplicate.

It will easily be understood that on the allowances for wages and rations a surveyor could not be generous. In most cases he went into the woods without even a tent, and when it rained the men peeled bark from the trees and made a rude shelter of it. But as the bark will not always peel, it would happen that the party had to lie down without any covering, and in the journals of Mr. Burwell there are frequent notes of this kind of experience. There was no allowance of tea or coffee with the rations of flour, pork and peas, and the early records do not give a hint of any other beverage. But twenty years after Burwell's earliest venture as a land surveyor, when Roswell Mount of Caradoc was provisioning a party to lay out a township on the St. Clair river—it was named St. Clair, but has since been divided into the townships of Sarnia and Moore—he began with the purchase of a barrel of pork, a barrel of flour and a barrel of whiskey.

We have travelled far since those early days, as witness some articles in the allowance of stationery supplied to the surveyor of ninety years ago, for which he gave to the Surveyor-General a detailed receipt. One item is 25 quills, for although steel pens were made before the close of last century, they did not come into general use until the middle of the present one. Another was a stick of sealing wax to seal letters, long before the days of the envelope. A third was a piece of mouthglue, so completely gone out of use that a specimen of it would be a curiosity now. A fourth was "one Indian rubber," and a sample in my possession is as dry and hard and brown as a mummy of the days of old Rameses. There were also papers of ink-powder, black and red, but men under sixty may remember the use of ink powders. Some of us, whose faces have not lost the country bronze, who lived in the country school sections, twelve miles away from the nearest general store, may even recall memories of the fluid we helped to compound in an iron pot from the inner bark of the swamp maple, with green vitriol and sugar added—ink of just a slightly deeper shade of purple than Emperors were wont to use in writing their names, which shone like varnish on the paper and crackled like burning brush when the copybook was opened, and was viscous enough to arrest a house-fly. I think I could identify that swamp-maple ink upon the written page after a lapse of ninety years; yet, in spite of the scrutiny and microscopic economy of the audit office, I am sure that Mr. Burwell was never forced down to the level of using it, at all events not in his official correspondence nor in his journals. But the records afford not a few illustrations of the infinitesimal mind that directed the audit office when Francis Gore was Lieutenant Governor. One is reminded of Elia's man, John Tipp, of the South Sea House, who thought an accountant the greatest character in the world, and himself the greatest accountant in it. Auditor is Accountant writ large.

The Surveyors often were annoyed by delays in the passing of their accounts, although it happened sometimes that the Receiver General was more to blame than the Auditor—when there was no money in the Treasury. This, however, is slightly a diversion, and I come back again to the subject.

Mr. Burwell was enjoined to read his instructions carefully, and not to leave Toronto until satisfied that he understood them; and he was directed without loss of time, as soon as the season might permit, to proceed with the work, but not until he had reason to believe that the waters had left the woods, so that there might be no fear of delay by commencing at an unseasonable time of the year, with himself and his men idle while under pay. "I have perused my instructions and looked over the plans," he wrote on April 1st, "as carefully and as much as I possibly could for the short time I have had them in my possession, and see nothing to prevent my putting the instructions into execution as soon as time will allow." On the same day he drew the allowance of stationery, and having gone to his home in Bertie township he began to fit out for the enterprise in hand about the middle of May. Four days were spent in making out voucher forms, a field book and plans of the townships, and then he was ready to begin the journey to Port Talbot. I quote a few pages of the journal.

"Sunday 21st May. Could not set out with a Boat on account of the Ice being wafted to the North side of the Lake.

"Monday, 22nd May. Believing it would be difficult to hire men enough at Long Point or Port Talbot for my Party to consist of, and being ready to set out I engaged three, by name, Edward Kerr, John and Robert Burwell. Kerr for a Chain Bearer at 2s. 6d. currency per day, and the Burwells at 1s. 6d. per day each. Set out from Fort Erie and reached Point Industry. It rained all Night."

Point Industry is west of Point Albino and Sugar Loaf. It is lot 14 on the lake shore, the most southerly land in Wainfleet, and was patented to David Morgan in 1817. It seems likely, however, that Morgan was an old squatter here, as in the first edition of D. W. Smith's Topographical Description of Upper Canada (1799), Industry Point is also called Morgan's Point.

"Tuesday, 23rd May. We set out early in the morning, had contrary Winds, and it rained all day, however, by being assiduous we reached Oustine's Creek.

"Wednesday, 24th May. Set out early. Winds still contrary, but reached St. Gust at 11 o'clock a.m., and the Wind breezed up so strongly from the South that we had to put into the mouth of the River for Safety."

St. Gust is one of the several aliases for the most southerly point of Walpole. In Smith it is called St. Dusk or Sangas, and the same name is given to the stream which empties into the lake just east of it. On the U. S. Lake Survey chart the stream is called Sandusky river, and the point itself Peacock Point.

"Wednesday 24th May. Reached Colonel Ryerse's in

Woodhouse, with some difficulty, by rowing against the West Wind. I embraced the afternoon to enquire for men to engage, but found none.

"Friday, 26th May. The Boat I went up in went no farther than Long Point. I went to Dover in quest of one, and of men to assist me, but all to no effect.

"Saturday, 27th May. Was told that Stephen Bartow of Charlotteville had a Boat. I went to get it, but he wanted it himself. Made inquiry elsewhere, but could not hear of any in the vicinity of Long Point, and I found no men to engage yet. Mr. Mitchell, the schoolmaster informed me that Col. Talbot had taken considerable of pork to his place, and he presumed part of it was intended for me, also that I could get a sufficiency of Flour there, and finding that I could not get a Boat, I concluded to set out on Foot. I could not engage any Men.

"Sunday, 28th May. Rained severely the whole day, that I could not start.

"Monday, 29th May. Rained until 2 o'clock p.m. I offered two Indians the wages allowed, but they said it was too little. We travelled to the house of Thomas Welch, Esq., tarried all night.

"Tuesday, 30th May. Set out early. Mr. Welch sent his son to pilot us to Big Creek, there being no Road to that place. Found the creek very high in consequence of the great fall of rain. Travelled on within four miles of Big Otter Creek and encamped. Rained smartly in the night.

"Wednesday, 31st May. Hindered some time crossing Big Otter Creek, had to fell a large Hemlock Tree across it, which would have failed us had not the Creek been narrower below, that the Banks interfered as it swam down. We had to fall a tree across Catfish Creek also and encamped on good land a mile to the Westward of the creek.

"Thursday, 1st June. Travelled on to Kettle Creek and had to fall timber across it,—reached Port Talbot after Sunset and it rained in the Night."

At the mouth of Big Otter creek is now the village of Port Burwell, named after Surveyor Mahlon Burwell. At the mouth of the Catfish is Port Bruce. This stream was formerly called by its French name, Barbet river, and a line drawn due north from its mouth was the west boundary of Norfolk county. At the mouth of Kettle Creek is Port Stanley at first called Stirling. The name of this stream, like the one east of it, has also been anglicized, it having been known in the days of the French occupation as the Chaudiere river.

"Friday, 2nd June. Colonel Talbot engaged William Coyl to go with me at 2s. per day, it being the lowest he could be engaged for. Finding it impossible to get either Provisions or men enough to constitute my Party at Port Talbot, I set out for Long Point in a Bark Canoe, that I might be at the return of the Boats from Fort Erie and engage one to take my Provisions to Port Talbot. The weather somewhat unfavorable, hat we only reached Catfish Creek. After conversing with Col. Talbot I found myself at a loss how to act, his wishes differed so very much from the tenor of the Instructions I received from the Surveyor General's office."

This difference seems to have been owing to undue haste on Colonel Talbot's part, for the letters show that when he had perused the instructions he did not disapprove the plan.

"Saturday, 3rd June. Left Catfish Creek early but were soon interrupted by a head Wind. However we proceeded on to the Three Gun Battery and encamped."

The Three Gun Battery is not now known as a geographical term on the shore of Lake Erie, and I have not found it mentioned elsewhere than in Burwell's journal. It is again referred to in connection with a traverse of the front of Houghton. "Proceeded from Big Otter creek down to the Three Gun Battery," the Journal of July 4th notes; "here are immense sand hills above the regular high Banks, from the summit of which is a prospect of all the surrounding country." Most likely it was a name given to the sand dunes in Houghton, ten miles west of Big creek in Walsingham, eight miles east of Big Otter creek in Bayham, and near to the hamlet of Houghton. There are three hills, which extend for three-quarters of a mile along the lake, and apparently have been built up with the sand blown by winds from the beach. The largest, which is on lot 10 and lies between the other two, is 990 feet long, 300 feet wide, and rises to 195 feet above the water's level. The lake bank itself rises to 70 feet, which is about the average height from Port Dover west as far as the county of Kent. Mr. John Alton of Houghton, to whom I am indebted for this description, has forwarded a sample of the sand, and states that the material of the hills and of the beach is as nearly as possible the same. It is composed almost wholly of grains of silica, with small percentages of felspar, limestone and garnet, all finely rounded. "You may wonder from its appearance," Mr. Alton remarks, "why it does not blow away. But it has the peculiar trait of holding moisture well, and during a season of drought one can kick out moist sand at a depth of one or two inches from the surface." The effect is to keep the hills solid and compact, and there has been little change in their form within the memory of the oldest settlers. They command the best view of Lake Erie to be obtained at any point along the coast, and a number of tourists visit them every summer.

"Sunday, 4th June. Proceeded on the way, crossed the carrying place and arrived at Col. Ryerse's at night."

The carrying place from the lake to the head of Long Point bay at the end of last century was a flat of sand about eight chains wide, according to Smith, which sometimes was sufficiently overflown to be used as a passage for small boats. As late as 1832 there was little or no change in its condition, according to Bouchette, there being a passage for boats through a small brook when the waters were high, and when they were low boats were easily hauled across the slender isthmus. Now Long Point is separated from the mainland by a wide channel of shallow water.

"Monday, 5th of June. Went in Quest of a Boat and men to assist me, was at the General Training of the Militia and engaged Cornwall Ellis and his Boat to take my Provisions to Port Talbot.

"Tuesday, 6th June. I went to Townsend to hire men to go with me, but did not meet with any.

"Wednesday, 7th June. I was fortunate enough to procure three Men, by name, John Bacon, John Rice and Jesse Millard. I agreed with Bacon for 2s. 6d. per day, with Rice for 2s., and with Millard for 1s 4d. per Day.

"Thursday, 8th June. I engaged Jeremiah Wolfen to go with me for 1s. 8d. per Day, and was all in readiness to set out for Port Talbot, but the Wind blew contrarily that I could not proceed, and then Wolfen refused to go at all, and I could not complete my party, but determined to proceed in the morning.

"Friday, 9th June. Loaded the Boat early and rowed against the Wind to the carrying place, or Isthmus of Long Point. We took everything across to be ready in the morning.

"Saturday, 10th of June. Loaded the Boat early and rowed against the Wind to Big Otter Creek; the Wind blew hard and we lay by. About 6 o'clock P.M. it calmed and we rowed up to Catfish Creek by 10 o'clock P.M. there was a heavy swell and when entering the mouth of the Creek the Boat had like to have filled and my Trunk and my Papers got wet, by which some drawing Paper was considerably injured.

"Sunday, 11th June. There was a violent sea that it was impossible to proceed on the way.

"Monday, 12th June. The Lake raged most tremendously all day that we could not move out of the mouth of the Creek, so I searched for the limit between the Townships of Yarmouth and Houghton, on both sides of the creek, but all to no effect.

"Tuesday, 13th June. Early in the morning I set out with a pretty rough Lake and we rowed hard until 2 o'clock P.M., when we reached Port Talbot.

"Wednesday, 14th June. It rained very hard all day that I could not proceed into the Woods. Colonel Talbot altered his opinion respecting the operation and did not wish to deviate from the intent of my instructions, and I regretted that I had written the Acting Surveyor-General on the subject."

These extracts from the journals show the difficulties and dangers which beset the early surveyors of our Province in parts of it which were the most easy of access by the best transportation of the time. To reach Port Talbot from Fort Erie with assistants and provisions, Mr. Burwell was occupied twenty-four days, and during much of that period himself and the men were exposed to the stress of weather, without shelter, and sometimes in peril of their lives; and journeying slowly on as best they could, on foot through a wilderness of brushwood and briars, or in open boat coasting a shore of high bluffs on the most treacherous of all the great lakes, which in the months of May and June is peculiarly liable to gales that sweep it for an unbroken length of more than a hundred miles from the south and west. Today a party can leave Toronto in the morning, take a run of 120 miles in a railway coach, drive fifteen miles across country along a finely graded road and arrive in Port Talbot early in the afternoon of the same day. That fifteen miles embraces th first section of the Talbot road which Mr. Burwell was employed to survey. Some of the best farming land in Canada is to be seen there; and if on reaching the Southwold and Dunwich townline the traveller enquires, he may have pointed out to him the house where Col. Mahlon Burwell lived with his family for a third of a century, as well as the little building of red brick where he kept the register of titles for Middlesex county ; and beyond these the quiet churchyard by the roadside where under the shadow of great forest trees is a grass-covered mound and a stone with this inscription :

SACRED
TO THE MEMORY
OF
MAHLON BURWELL
WHO DEPARTED THIS LIFE
THE 25TH DAY OF
JANUARY A. D. 1846
AGED 62 YEARS
11 MONTHS AND 7 DAYS.

HE WAS FOR SEVERAL PARLIAMENTS A MEMBER OF THE
HOUSE OF ASSEMBLY FOR THE
COUNTY OF MIDDLESEX, AND
FOR ONE PARLIAMENT MEMBER FOR THE TOWN OF LONDON.

In the plan of this paper I have purposely entered into details of the beginnings of Col. Burwell's work as a land surveyor, to illustrate the value of his letters and journals as materials of history, but without a pretence to elaborate them into literary form—for history is not written hastily in broken hours at the end of a day's work. What remains to be done is the harder task of presenting within the limits of a few pages a clear idea of the extent and nature of Burwell's labors during the next twenty or more years of active career as a surveyor ; or down to the time when, though still in middle life, his physical powers had decayed and he was no longer able to execute a commission from his chief. "Should His Majesty's Government require that this township (Dunwich) should be resurveyed," he wrote to Acting Surveyor-General William Chewett on February 24th, 1832, "may I beg that you will not order me to perform the service, as my health would really not permit me to go into the woods at this time,"—and he suggested the name of another to whom the order might go instead. After that time it does not appear that Mr. Burwell attempted any work for the Government except to finish the surveys of one or two townships which he had commenced long before. A list of his undertakings from 1809 to 1835 includes surveys in whole or in part of the townships of Wainfleet, in Haldimand ; Houghton, Middleton and Townsend in Norfolk ; Bayham, Malahide, Southwold and North Yarmouth, in Elgin; Caradoc, Ekfrid, Lobo, London, Mosa and Westminster, in Middlesex; Harwich, Howard, Orford, Raleigh, Romney, Tilbury East and Zone, in Kent; and Colchester, Gosfield, Maidstone, Mersea, Rochester, Sandwich and Tilbury West, in Essex. The list also includes surveys of the towns of London and Chatham (the latter being a re-survey); of Talbot Road East, from the west line of Southwold to the east line of Middleton; of Talbot Road North, from the west line of Southwold to the junction with the Longwoods Road in Westminster; of Talbot Road West, from Port Talbot to the town of Sandwich on the Detroit river; of the Middle Road, midway between lake Erie on the south and the river Thames and lake St. Clair on the north, from the east line of the township of Orford to a point of junction with the Talbot Road in the township of Sandwich; of the Brock Road in Wellington, from Guelph to the rear of Flamboro; of the north limit of lands purchased from the Chippewa Indians in 1827, from the northwest corner of Garafraxa to lake Huron; besides several Indian reserves in the counties of Middlesex and Lambton.

The survey of Talbot Road East, or Colonel Talbot's Road, as it was first called, occupied the whole of the season of 1809 and part of 1810; and the work was pushed on without cessation every day the party was in the woods, the only days of rest being the rainy days. The limits between Dunwich and Southwold, Southwold and Yarmouth, Yarmouth and Houghton, and Houghton and Walsingham, were first traversed, the western boundary of Yarmouth being intended as a governing line, and the most eligible points of intersection for the road were found in this way. No difficulty was experienced in discovering a suitable location across Southwold and Yarmouth, and only two courses were necessary in the former, made to avoid a marsh in which Talbot creek had its source. The southern part of Yarmouth had been surveyed in 1799, where a grant of 5000 acres was made to Hon. James Baby and his brothers. In the instructions to Surveyor Jones Yarmouth was described as situated between Southwold and Houghton. The original intention was to run the road through the seventh concession, but Mr. Burwell's explorations showed that a more favorable route was one on the line between the eighth and ninth concessions. He reported it as "an extraordinary place for the Street to pass, there is but Four Chains of Swamp the whole way and that not bad." To the east of Yarmouth the country along the projected line was broken by gullies and swamps. "All the creeks of any account between Port Talbot and Long Point," Mr. Burwell observed in one of his letters, "come from the North East to within about eight miles of the Lake, and then run nearly a South course into it." This was the real cause of the difficulty of finding an easy route across Houghton — whose western boundary at that time was the east line of Yarmouth—for the direction of the road was nearly parallel to the main streams in their upper reaches, and it crossed many of their tributaries. But a fairly good route was obtained in the end, which for the last thirty miles eastward lay in a splendid forest of pines. The terminus of the road was at the eastern line of Middleton, where the village of Delhi now stands ; but the name of Talbot Road has been applied to one extending eastward through Cayuga in Haldimand.

Mention has been made of the difficulty Mr. Burwell had in procuring supplies of provisions for his first campaign. He was destined to have more experience of the same sort before the end of the season. The quantity which he at first thought sufficient to complete the survey was entirely expended at the beginning of September. Everything was in such a situation that the whole party had to march out, as clothes and shoes were required as well as provisions. The first day they travelled twenty miles and encamped on Big creek. Going by way of Townsend, the settlement on the lake was reached on the third day. But all the flour there had been sent away, and the only thing to be done was to thresh wheat and get it ground. A team was hired to carry a barrel of pork from Col. Ryerse's to Townsend, and on the fifth day the men threshed seven bushels of wheat and took it to Sovereign's mills. But the miller was not at home, and as a last resort on the seventh day the grist was ground by one of Burwell's own men.

On Sunday, September 10th, Mr. Burwell records in his journal : "I took a Boy and Two Horses whom I had engaged to Pack the Flour and Pork to the Survey on the Old Road, had much trouble on account of Logs, Brush, Briers, &c., but reached Big Creek." Next day the provisions were packed into Houghton, "and it took us faithfully all day to proceed Seventeen Miles." There a deposit was made, and taking a supply they proceeded to resume work at the point they had left twelve days before. Such is an instance from life in Norfolk county ninety years ago.

In 1810, besides finishing the survey of Talbot Road East, Mr. Burwell surveyed the southern part of the township of London, which was believed to be suitable for the cultivation of flax. "I kept a Proof Line in the centre of the Township," he wrote to the Surveyor General's office, "that my Survey might be as correct as possible, on which I proved every Concession line that I run, by measuring on the said Proof line, and can say that the operation is very correct." This was the origin of the name of the road which leads out of the city of London to the north boundary of the township. He also received instructions to survey the vacant land between Houghton and Yarmouth, and to divide it, if sufficiently extensive, into two townships, under the names of Malahide and Bayham. The work was done accordingly, and under date of February 12th, 1811, the Lieutenant Governor commanded his secretary to acquaint the Surveyor General that "the townships of Malahide and Bayham are to be annexed to the county of Middlesex." In making this survey Mr. Burwell selected a block of land in Bayham at the mouth of Big Otter creek, a part of which was subsequently surveyed for a town plot and called Port Burwell. Writing of that region to the Surveyor General in June, 1815, he said: "Otter Creek discharges more Water than all the small Rivers which disembogue themselves into the North side of lake Erie excepting the Grand River. When a few drifts are cleared out of it, Boats may descend from the Mills in Norwich to its mouth, at almost any season of the year. There are beautiful Groves of White Pine Timber on each side of the Creek, interspersed with Groves of other Timber, alternately; there is, therefore, no doubt, but what ere long considerable quantities of Lumber will be conveyed down that stream, from Norwich and other places to the Lake. It would appear as if Nature had intended the mouth of Big Otter Creek for a place of greater importance than any other in the District of London. In my mind it is highly probable that such will be the case before many years. I am about to lay out what Land I own on the East side of the mouth in a Town Plot." At the same time he encouraged the Government to lay out an adjacent lot held as a reserve for the same object; and "if it should meet with the approbation of His Excellency the Provisional Lieutenant Governor, it would much facilitate the future growth of that part of the Province, to have it laid out by the Government, for a Town at the mouth of Big Otter Creek." But these bright anticipations have not been realized, and although the town is beautiful for situation, it has been for many years a finished town. Like its neighbor town, Vienna, on the same stream, its glory departed when the last of the Big Otter pine was cut.

The north branch of Talbot Road was laid out in 1811, the object of it being to connect the main line of the Talbot Settlement with the road through Westminster. Its western end is at the Dunwich and Southwold line, where the village of Iona now is, and it extends eastward through Southwold parallel with the main road, to a point where five roads converge, long known as Five Stakes, but now called Talbotville Royal. Thence the road runs north to join the Talbot Longwoods Road in Westminster at a place formerly known as the Junction, but now called Lambeth, six miles from the city of London.

An instruction was received the same year to survey under the direction of Col. Talbot a road from Port Talbot west near the shore of lake Erie to Amherstburg on the Detroit river, to be known as Talbot Road West. "In surveying the road through Dunwich and Aldborough," Mr. Burwell wrote to the Surveyor General on October 24th, "Colonel Talbot directed that I should begin to number the Lots from his Mills and continue to the westward, which I have done, and also continued numbering them in succession as far as the Survey extends at present; without regard to the Townships through which they pass." Work was commenced on August 26th and was carried on until September 8th, when the survey reached lot 90, near the west side of Howard, and was then discontinued for the season.

It is likely that Mr. Burwell had before this time left his home in Bertie, as a deed dated February 25th, 1812, from Col. Talbot to him of a small piece of land in lot 24 of the 11th concession of Dunwich, describes him as of Port Talbot.* But the war between the United States and Great Britain, which had been threatening for several years, broke out in the summer of 1812, and until peace was again established surveying operations near the frontiers of this Province were suspended.

Only a few references to the war occur in Mr. Burwell's official letters, and no information is conveyed in them that he was engaged in military service. The report of the Loyal and Patriotic Society states, however, that he was active against the enemy on all occasions and became odious to them. The letters show that he was at the Niagara frontier in 1812 and 1813, when fighting was going on there, and that in the following year when a small body of

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*Mr. Gill, the registrar of London, informs me that Mr. Burwell was appointed registrar of Middlesex in 1811, and that the first deed was registered by him May 28th of that year. The first registry office for the London and Western Districts was established February 20th, 1801, and the seat of the office was at Turkey Point, with Thomas Homer as registrar. The office was afterwards removed to Vittoria, and again to Princeton.

American soldiers ravaged the Port Talbot settlement, he was carried off as a prisoner of war and his maps and instruments destroyed. A map of Malden had been given by him to Proctor when that General was on his way to take command at Amherstburg in 1812, which was afterwards taken by the enemy and destroyed, with his papers. "The plans of the other Townships I had deposited, with the Instruments and other appendages of my Surveying Establishment, at a person's House, where I thought they would not be likely to be suspected or discovered, but when the plundering party came through which swept the whole Settlement and captured me, all was taken and destroyed—and I have not been able to get properly equipped with Instruments yet." This was in explanation to the Surveyor General (November 4th, 1815) of the loss of plans of townships traversed by the projected Talbot Road West. One other reference to the war is worth quoting. It is found in Mr. Burwell's journal of the Talbot Road West survey under date of September 18th, 1816. "I passed the place in Front of Lot No. 177 (Tilbury East) where Major Holmes of the United States Army had encamped a Day or two ago, when on their intended expedition against Port Talbot in time of the late War. I find here, as well as upon every other occasion, when they have remained all night in our Woods, they have felled large Trees flat to the Ground all round their Encampment, to serve as a Breast Work in the event of an attack. Two Field Pieces and ammunition Waggons were left here by Major Holmes, which were destroyed by the Loyal Essex Rangers. The Carriages were burnt, and the Guns and Ammunition were carried back and deposited in a Black Ash Swamp where they remained until the Treaty of Peace." The Major Holmes of this record is no doubt the same officer as the Colonel Holmes commanding at Amherstburg, mentioned in Sir Gordon Drummond's dispatch of May 27th, 1814.

The survey of Talbot Road West was resumed by Mr. Burwell in the summer of 1816, and under instructions the western terminus was fixed at Sandwich instead of Amherstburg. The final report upon it was not sent in until the end of 1824.

The first settlements in Kent County were formed upon the river Thames, and after the Talbot Road began to be opened up a scheme was proposed to the Government by Col. Talbot for a main road to follow as nearly as practicable the height of land between lake Erie and river Thames across the county. This was referred to Mr. Burwell, and reporting thereon to the Surveyor General in August, 1821, he expressed the opinion that the laying out of a Middle Road on the highest ground or dividing ridge would tend much to quicken and consolidate the settlements between those waters. The work was entrusted to himself, but as the road as finally laid out extended from a point of junction with the Talbot Road in the township of Sandwich eastward to the county line between Kent and the present county of Elgin, it was not completed until September, 1825. The last division of the survey is the most easterly, being in the township of Orford, and as the height of land there is very irregular it was found necessary to alter the direction of the road frequently. There are in all twenty-eight courses across the township, which has a width of 6¾ miles, and only one lot has a straight front. A large tamarac swamp was met with on the way, and there is a tradition that Mr. Burwell was nearly defeated in the effort to find a pass through it. The situation was reported to Col. Talbot, who with his usual urbanity directed the surveyor to follow the ridge. "Follow the ridge, if it takes you to—Hades." But I need not say that Col. Talbot used another word.*

There are many matters of interest connected with surveys of the townships north of the Thames, and of Indian reserves there and on the St. Clair river and lake Huron in Lambton county ; and there are also some interesting observations of natural history that deserve attention. But these must be left unnoticed in this paper, in order that its short remaining space may be devoted to the largest of Mr. Burwell's undertakings in his later years as a land surveyor.

The Government of the Province in 1825 made provisional terms with the Chippewa Indians of the London and Western Districts for the surrender of 2,200,000 acres lying to the north and west of former cessions, and about the same time it entered into an agreement with the Canada Company for a transfer of 1,000,000 acres of the same land, in a block which afterwards became famous as the Huron Tract. By order from the Surveyor General's office of July 6th, 1827, the survey of the northern boundary of the new purchase was undertaken by Mr. Burwell, and the work was carried on and completed during the months of September,

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*I heard this story from the late John Sinclair, who moved from Aldborough into Orford in 1832, and took up a lot on the Middle Road. My father, the late John Blue, was the second settler on this road in Orford, having been located by Col. Talbot late in 1826 or early in 1827. His nearest neighbor was four miles away, and the woods were alive with turkeys, deer and wolves.

October and November. Provisions for the expedition were purchased at Guelph, and were packed northward to the starting point of the line, at the northwest corner of Garafraxa. A journal entry of September 19th reads: "Met Mr. Galt near Guelph, who invited me to dine on Friday the 21st Instant at his House near Burlington Bay"; and under the latter date is this entry: "Went to Dine with Mr. Galt at his House—was civilly treated—an agricultural party—Mr. Galt proposed that I should be a member of the Agricultural Society of which he is the head. I declined. Did not know that it was an agricultural meeting until after the cloth was removed. Left Mr. Galt's about 10 o'clock p.m. and slept at Mr. Beasley's." This is the nearest approach to a supercilious tone that I have discovered in all of Mr. Burwell's official writings. But no one could have more heartily enjoyed the scorn of the land surveyor than John Galt himself.

The survey of the line was commenced on October 4th. Ten days were spent in running 18 2-3 miles, as progress was much hindered by dense swamps of cedar, tamarac and spruce. Then the head waters of the Menesetung river (now called the Maitland) were reached and a very fine country was entered. During the next ten days the line was run 29½ miles, and the river was crossed frequently. In four days more, during which the survey bore away northward from the river, lake Huron was reached at 59 miles 39 chains from the starting point. Storms of rain, hail and snow were frequent and the actual running time was only nineteen days.

The return journey occupied six days, and was made disagreeable by storms of rain and snow, and by the swollen waters of the river, which had to be frequently forded. The stores of provisions which had been left at various points for the return trip were found to be destroyed by wild animals, and it was observed that bears, wolves, foxes, fishers and martens had followed the party along the line. A note of Natural History is entered in the journal of November 3rd, upon the authority of the Indians. "The Deer all appear to have left Lake Huron, some time ago, for the shores of Lake Erie, where the Snow does not fall so deep, and this the Chippewa Indians inform me is uniformly the case with them every autumn, to avoid being taken by the Wolves during the deep snow of this neighborhood, which is frequently crusted over." This is doubtful, and I do not think it has been confirmed by observation elsewhere in our country.

The instances are exceedingly rare in which the land surveyor unbends himself in the letters and journals of Mr.

Burwell, and one might suppose that the beauties of landscape and of woodland scenery were unappreciated by him. But over the Huron Tract he grew almost eloquent. "Notwithstanding the fatigues and privations attendant on such a tour," he reports to the Surveyor General, "I have had great pleasure in surveying the purchase line—the country through which it passes is magnificently fine. The River Menesetunk is about half the size of the Thames. It is a fine river of pure, clear water. Its banks afford numerous eligible situations for country seats to the right and left, sufficiently elevated and in variety to add beauty to their appearance, and in general they are easy of access, and the Flats extensive. When you are in possession of the Field Notes, Map, and report of the Survey of the purchase line, and the exploring expedition for the Canada Company in detail you cannot fail to feel a deep interest in this part of the country."[*] It would be a wonder indeed if a stream of so much picturesque beauty flowed on forever without a poet to write a verse in praise of it. The Menesetung has its singing lover, and although I think his genius has been nurtured overmuch on the metrical version of the Psalms of David, he sings out of the heart with a swelling note and a touch of Robert Burns.[**]

Unknown to fame thy waters run,
  Past groves of living green ;
And all obscure they gently flow
  Thy gentle banks between ;
Thy beauties ne'er have found a voice,
  Thy charms are yet unsung ;
Be mine to sing in humble strains
  Thy praise, Menesetung.

No tumbling torrent roaring down
  Its rocky bed art thou ;
Thy peaceful waters murmuring low
  Kiss soft each nodding bough ;

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[*] Menesetunk, as the word was written by Burwell, is stated by him to signify in the Chippewa language a large open harbor. In a private letter to Ridout he says : "The Canada Company have called it the Nocton, after an estate of the father of Lady Goderich in England, and they have called the mouth of the river Goderich Harbor." Mr. J. C. Bailey, the railway engineer, who is one of the best of our local authorities, writes in reply to an enquiry : "Goderich, or in that neighborhood, was called by the Indians Ma-ne-se-tung. So, if the Maitland river was called after the village—as the rivers generally are—it should have the word 'se-be' after it, which means a river, and should then read Ma-ne-se-tung-se-be. Me-nis means an island ; Me-nis-ing, in, at or on an island ; Me-ne-ting, an island in a river ; Me-ne-te-goje-wun, an island in a rapid." At about 25 miles from the starting point of the purchase line survey it is described by Burwell as "a fine river with islands, gentle banks, and stoney bottom."

[**] The writer is my associate in the Bureau of Mines, Mr. Thomas W. Gibson, who was born in the village of Wroxeter, on the banks of the Maitland.

The sombre cedars bathe their limbs
  Thy crystal depths among ;
And mirror'd hemlocks sigh to thee,
  Oh, fair Menesetung !

The dappled trout in many a pool
  Their speckled beauties hide,
Or, startled from their shy retreat,
  Swift down thy current glide ;
The wild canary builds her nest,
  And rears her timid young
Upon thy calm sequestered banks,
  Oh, sweet Menesetung !

No lordly ships thy bosom bears,
  Slow-moving, one by one,
Unknown, obscure, thou turnest still
  Thy bright face to the sun ;
But while my heart within me beats
  Till life's last change is rung,
I love thee still, and love thee well,
  Oh, dear Menesetung !

But if an idea that once possessed some leading men of the Canada Company had taken substantial shape, the "lordly ships" might have become a moving feature on the bosom of the Menesetung. Mr. Burwell was strongly impressed with the practicableness of the scheme ; and in his report to the Surveyor General he ventured the opinion that the river might be the means of affording greater facilities for making a canal to pass between its banks and communicate between lake Huron and lake Ontario than any other that could be selected for that purpose. This river, he observed, passed through a very fertile tract of country, and discharged itself at a good position into Lake Huron, so that a canal in its direction could not fail to produce very great advantages as well in a commercial as in a military point of view. "In producing the purchase line from its place of beginning, after crossing several rills trending in Northwesterly directions, I crossed the Menesetunk in the 21st Mile at which place it is 80 links wide and 18 inches deep, coming from the North East and affording I should think a sufficiency of Water for a canal. Between the 21st mile and the 45th mile the line crosses the Menesetunk, which constantly increases in size, seventeen times alternately, when it leaves the line and trends southerly to where it disembogues itself into lake Huron. Its general course is westerly, watering equally well the tract of country not yet conceded to His Majesty's Government with the late purchase. The rapidity of its current will compare with that of the River Thames, or Grand River, excepting that for several miles above the outlets of those rivers their waters are apparently dead while the current of the Menesetunk continues to within half a mile of its entrance into Lake Huron. The Grand River having its source nearly upon the summit level of the lands between Lake Ontario and Lake Huron, and being sufficiently large to afford feeders to a canal to both right and left, I conceive that the difficulty of connecting its waters with those of the Menesetunk and the 12 Mile Creek might be accomplished with more ease, and at less expense of excavation than might be at present anticipated. I should think that a position some ten, or fifteen miles above the Falls of the Grand River might be the best; from whence a connection could be made with the waters of the 12 Mile creek, along the side of which the canal could be taken to Lake Ontario. Should such a work be undertaken, and a position selected for crossing the Grand River at, or near the Falls, the feeder could be brought from a sufficient distance up the Grand River to avoid any increase in the expense of excavation save that of the feeder, and then if it was thought expedient, the canal might be taken past the Town of Guelph, and connected with head waters of the 12 Mile Creek in Flamboro East, not far from the Road which has lately been surveyed from Guelph to the rear of the Flamboro's, or if no obstacle should prevent it, pass directly to the Canal at Burlington Bay." But nothing was attempted, and however feasible the project might have been when the whole country was in forest, and the streams were full and strong-flowing throughout the year, it is scarcely possible under present conditions that it can ever be revived.

There are a number of other interesting matters in the Burwell letters and journals that I would gladly have touched upon, but my paper is already much too long. In the preparation of it one of my aims has been to direct the attention of others who have more leisure than myself, and who possess historical tastes and gifts, to a treasure house of material which no one has yet ventured to explore or work over, and of which the Burwell letters and journals are a very little part. But whoever will undertake to exploit that treasure house with any degree of intelligence and thoroughness will soon become convinced that there is necessity for a new departure in the care of its contents, which ought to be treated as possessing great historical as well as official value. If we cannot have a Reference Library for the Province, with a Librarian possessing industry and genius in charge of it, established upon the scheme conceived and matured by the Canadian Institute, let us at least have a Provincial Archivist whose office should be the collection and care of every paper, and letter, and record, and document that concerns the public and official business of the Province.

BIOGRAPHICAL NOTE. The Burwells are an old family, whose homes in England were in Bedford and Northampton. More than two and a half centuries ago some of them came to America, settling in Virginia. They were loyal to Charles I. throughout the Civil War, and some were loyal to George III. in the American War of Independence. In Sabine's Loyalists a sketch of one James Burwell of New Jersey shows that he served the King seven years, having enlisted in 1776, that he came to Upper Canada in 1796 where he received 200 acres for himself and each of his children, that he removed to the Talbot Settlement in 1810 and died there in 1853, aged 99 years five months. He was probably related to Adam Burwell, but that is uncertain. The latter was also a native of New Jersey and came to Canada with his wife and family after the war. The records show that he settled in the township of Bertie, and that in 1797 he received a grant of 850 acres of land for military service ; but the petition in which his claims were set out appears to be lost. There is a tradition in the family that he had large possessions in New Jersey, and that they were confiscated by the Government of the United States. Adam Burwell spent the later years of his life with his son, Col. Burwell. He died in 1828 at the age of 79, and was buried beside the walls of the English church in St. Thomas. His eldest son was the Mahlon Burwell of the foregoing paper, who was born in New Jersey, February 18th, 1783, studied land surveying, and through the influence of Col. Talbot got professional employment from the Government. In 1811 Mahlon Burwell was appointed Registrar of land titles for the District of Middlesex, and in 1812 he was elected to represent the Districts of Middlesex and Oxford in the Legislative Assembly of Upper Canada. He held the rank of Lieutenant Colonel of militia at this time, and during the war of 1812-14 was active against the enemy on all occasions, and became odious to them, although there is no record of his being in any battle of the war. In 1814 a band of Americans raided the Talbot Settlement, and although Col. Burwell was in his bed, ill of fever and ague, he was carried off a prisoner and held for many weeks in Ohio or Kentucky. In a second raid his buildings were destroyed by fire and his family was driven off. In 1815 he was established in Southwold, where the Talbot Road crosses the townline between Dunwich and Southwold, afterwards known as Burwell Park. A new registry building was erected there in which the office was kept until by authority of an Act of the Legislature it was removed to London in May 1843. Col. Burwell was re-elected to represent Middlesex and Oxford in 1816 and again in 1820. A redistribution took place before the next general election in 1824, and John Matthews and Dr. John Rolph were chosen to represent Middlesex. They were successful again in 1828, and referring to this contest in a private letter to Hon. Thomas Ridout (Aug. 22nd, 1828) Col. Burwell wrote: "Our Election lasted 6 days—when the Poll closed the votes stood—for Rolph 340—Matthews 317—Burwell 305 & Hamilton 275, Matthews 12 over me, and many of my Friends not allowed time to vote, although returned to the poll two or three times for that purpose." In 1830 Burwell was successful in Middlesex, but was defeated in 1834, and in 1836 he became the first representative of London town. During the whole of this period he held the offices of Registrar and Postmaster, and was almost constantly employed by the Government as a surveyor of Crown lands. But in those days the provisions of the Act for the Independence of Parliament were not as rigid as they are now. Col. Burwell had a family of seven sons, all but two of whom were named after great soldiers, viz., Alexander, Hercules, Isaac Brock, Leonidas, John Walpole, Hannibal and Edward. He had also two daughters, Louise and Mary. Of these only Edward and Mary are now living. All except Alexander and Louise are named in the will, which was executed eight days before Col. Burwell's death, and Alexander is no doubt the child referred to in a pathetic note to Surveyor General (Dec. 20th, 1817) written to explain delay in reporting a survey in Westminster. "You would have received the report long since, had it not been for a most dreadful circumstance which occurred in my Family in October last, which deprived me of the use of my right hand for more than two months—a little son of mine, two and a half years old was scalded to death, and in taking him out of the boiling water I scalded my Hands as related, but my right hand the worst." One ambition of Col. Burwell's life was to found a family, and with this object he memorialized the Governor in Council in 1829 for permission to extinguish his claim for 10,000 acres of land held in small isolated areas and receive in lieu thereof a block of 10,000 acres on lake Huron, adjoining the southern boundary of the Canada Company's territory, wherewith to make an entailed estate to his heirs forever. But no action appears to have been taken in the matter, and the records do not even show that the memorial was considered. But the idea possessed Col. Burwell's mind to the end, and by the terms of his will it was provided in the case of each of the sons that the lands bequeathed should be held to himself and his male heirs forever, and in the event of any one of his sons dying without issue the lands should descend to the next son and his male heirs. "I have willed thus to fasten the before mentioned freehold estates upon my children and their heirs forever because my own experience, which has been extensive in this Province, and History have shewn me that children place less value on that which is given them than that which they acquire by their own care and industry, and because I have acquired the estates so willed and devised by a steady perseverance and laborious industry in my profession as a surveyor of lands, of which my heirs can never be sensible : I exercise this moral, legal and conservative right for their benefit : and when advanced in age my heirs in all time to come if they be sensible persons will know how to appreciate the soundness of my motives." Ermatinger, who has written unjustly and unkindly of Col. Burwell (Life of Col. Talbot), says he was tall in stature and dignified in appearance.

Minutes of the Seventeenth Annual Meeting

— OF THE —

Association of Ontario Land Surveyors

HELD AT THE REPOSITORY, PARLIAMENT BUILDINGS,
ON THE 23RD, 24TH AND 25TH FEBRUARY, 1909.

The following members were present :

Abrey, George Spencer.
Ardagh, Arthur Gowan.
Barrow, Ernest George.
Beatty, Herbert John.
Bolton, Lewis.
Bowman, Clemens D.
Bowman, Herbert Joseph.
Browne, William Albert.
Chipman, Willis.
Dalton, John Joseph.
Dickson, James.
Dunn, Thomas Hamilton.
Esten, Henry Lionel.
Fawcett, Thomas.
Fitton, Charles Edward.
Fitzgerald, James W.
Galbraith, Cohn.
Gamble, Killaly.
Gibson, Peter Silas.
Hutcheon, James.
James, Darrell Denman.
Jones, Charles Albert.
Jones, Thomas Henry.
Kirkpatrick, George B.
Klotz, Otto.
MacKay, James John.
McLean, William Arthur.
Murphy, Charles Joseph.
Newman, John James.
Niven, Alexander.
Pierce, J. W.
Ross, George.
Selby, Henry Walter.
Sewell, Henry DeQuincy.
Smith, George.
Speight, Thomas Bailey.
Stewart, Elihu.
Stewart, L. B.
Tyrrell, James Williams.
Van Nostrand, Arthur J.
Watson, John McC.
Whitson, James Francis.
Wilkie, Edward Thomson.

The President, Mr. A. J. VanNostrand called the meeting to order and said : Gentlemen : The clock has just struck two and we had better begin business at once, as we have a good deal to do this afternoon. I will call upon the Secretary to read the minutes of the last Annual Meeting.

The Secretary—As the minutes of the last Annual Meeting have been already printed in the report, will some member kindly propose they be taken as read ?

Mr. Kirkpatrick moved, seconded by Mr. Wilkie, that the minutes as printed in the proceedings for last year be taken as read.

The President put the motion, which, on a vote having been taken, was declared carried.

The President—Is there any business arising out of the minutes ?

The Secretary—There is some correspondence concerning a discussion in the minutes last year regarding the employment of men by surveyors and the difficulty of having a proper form of agreement. At the last meeting it was discussed and it was decided that the matter be referred to Mr. Armour, our solicitor. It was referred to him and the correspondence is now in the hands of the President.

The President—I will ask the Secretary to read it.

The Secretary read the letter from Mr. E. Douglas Armour.

The President—Is it your pleasure that we take up the matter of the contract itself or leave that for a later period of the meeting ?

Mr. Niven—It might be well perhaps to read it.

The Secretary read the contract.

The Secretary—The Association has noted that they would like to put in a clause similar to that given by Mr. H. J. Beatty. The matter has been before the Council.

The President—This matter is brought up as business arising out of the minutes of last year, and it appears on page 26 of last year's Proceedings. It was the result of a long discussion on the question of contracts. The Council of Management have followed the instructions given them by the Association, and this is the result. It is now for the Association to discuss the contract and instruct the Council further as to what should be done with this particular form, whether it shall be made use of, and what use shall be made of it ; I mean as to the publication or otherwise in next year's report, and the printing of copies that will be available for the members.

Mr. Kirkpatrick—I may say, Mr. Chairman, for the information of the members present that the clause proposed to be put in, similar to what Mr. H. J. Beatty had in his contract, shows that he agreed to pay his men a certain fixed sum if they remained with him for the whole survey. If they left him without good cause during the time and left him in the lurch, they were only to get a certain amount for the time that they served.

Mr. Beatty—The clause that you refer to that I had in my contract was, that I agreed to pay the men a certain wage per month, or at the rate of a certain sum per month, on condition that they continued work until the survey was completed, but in the event of their quitting the survey for any cause without my consent, I had only to pay them I think it was $40 a month, about two-thirds of what I was to pay them in the first place. To give the figures, as nearly as I recollect, I agreed to pay my men, certain of them, $60 per month and all expenses if they remained until the survey was completed, but in the event of their leaving before the completion of the survey, I was to pay them at the rate of $40 per month, and I had the privilege, or the right, to deduct from that $40 per month their expenses that I had paid in bringing them to the survey, and I also could deduct a sum equal to what I would lose for the expense I would be put to in replacing them. It was really like bonusing your men, and if they left, you could pay them off and say: "Here, this was our agreement; I am only going to pay you $40, and you will have to pay my loss in getting men to replace you." That was the substance of it.

The President—Did it work out satisfactorily?

Mr. Beatty—In some of those old agreements they had, as we read in the letter by Mr. Armour, or in his form of agreement, that the surveyor could retain the whole amount. My solicitor told me no court in the land would enforce such an agreement as that because it was too one-sided. As a matter of fact, I had some men who left. I put in force this part of the agreement where they were to be paid the smaller amount per month, and I deducted from that their expenses coming out to the survey, and I charged them a certain sum for my loss in getting men to replace them. When they went out they put it in the hands of their solicitor, and when he wrote me I advised him to consult with my solicitor; I wouldn't have anything to do with the matter. My solicitor made a proposition to them and their solicitor refused it. They said they would sue me. We told them to go ahead. After some further correspondence their solicitor advised them to accept my settlement. They simply had to accept it. The difficulty the lawyers claim with reference to these agreements is that when you get them into the Division Courts the judges will not strictly interpret the contract; they go to work and form up something of their own and say, "This is fair." If you had a High Court case, it would be purely a question of law, and the contract would be interpreted strictly according to its wording, and if they broke their contract they would forfeit my agreement. The Division Court judges, as a rule, do not pay much attention to the strict wording of the contract, and they fix it up the way they think is fair, without paying very much attention to the original contract.

Mr. Niven—I think we will have to let this stand over till we get that clause that is attached to it in line with what Mr. Beatty says, before it can be dealt with. The agreement does not go far enough for us exactly; it does not specify exactly what it should according to our ideas.

The President—Will you move that it be referred to the head of "Unfinished Business?"

Mr. Niven moved, seconded by Mr. Selby, that the matter of dealing with the proposed contract be referred to the head of "Unfinished Business."

The President put the motion, which, on a vote having been taken, was declared carried.

The Secretary—I have another letter here from Mr. Armour with regard to a question referred to him concerning the criminal law that applies to an individual obstructing the surveyor in the pursuit of his profession. It seems that the clause, although entered in our Act in small print, is not part of the law of Ontario, nor can it be so, owing to a Province having no control over the criminal law, therefore a difficulty arises in prosecuting a man under that Act. Mr. Armour says: (reads letter).

Mr. Niven—Apparently that will have to stand over also until our solicitor hears from the Minister of Justice, and I would move that it be referred to the head of "Unfinished Business."

Mr. Ross—I second that.

The President put the motion, which, on a vote having been taken, was declared carried.

The President—The next item on the programme is correspondence.

The Secretary—There is no correspondence except what we have read.

The President—The next thing on the programme is the President's address.

The President—The next item on the programme is the report of the Council of Management. I will ask the Chairman of the Council to present the report.

Mr. Kirkpatrick moved, seconded by Mr. Sewell, that the report of the Council of Management stand over until Wednesday afternoon.

The President put the motion, which, on a vote having been taken, was declared carried.

Mr. Dickson—Mr. President, I think we owe you a little more than simply a clap of the hands for the very able address you have given us. You have touched upon every subject that is of interest to the Association briefly and concisely, without using any unnecessary words, and I have very much pleasure in moving a vote of thanks to the President for the very able address he has given us.

Mr. W. A. Browne—I second the motion. (The motion was carried with applause).

The President—I thank you, gentlemen.

The next item is the report of the Secretary-Treasurer, including the financial statement.

The Secretary read his report.

The Secretary—Our surplus is not very much more than it was last year, owing to the large expenditure in the Board of Examiners' account, due to the long session we had and the fact that only a very small proportion of the gentlemen who came up passed, and of course there were no fees coming from the unsuccessful candidates. I regret to say there are still a great many unpaid dues. Once a member's dues go unpaid for three or more years, he allows them to run on and on, and if he goes away to the west or to the north or anywhere out of Ontario, he does not reply to my communications. Perhaps he does not get them, but I always write three times in the year.

Mr. Niven moved, seconded by Mr. Ross, that the report of the Secretary-Treasurer be received, and that the financial statement be handed to the Auditors.

The President—I see the Auditors for this year are Mr. McKay and Mr. Ward. Mr. Ward I know will not be here, and Mr. McKay has not come yet. I think it is probable that Mr. McKay will be here. As he was here when he was elected last year, he is pretty certain to attend to his duties.

Mr. Niven—Let the President appoint two new Auditors.

The President appointed Mr. Selby and Mr. Wilkie as Auditors.

The President put the motion, that the report of the Secretary be received and adopted, and the financial statement be received and handed to the Auditors for their report, which, on a vote having been taken, was declared carried.

The President—The next item is the report of the Board of Examiners. Mr. Kirkpatrick is the Chairman.

Mr. Kirkpatrick presented the report of the Board of Examiners.

Mr. Kirkpatrick moved, seconded by Mr. Niven, that the report be received and adopted.

The President put the motion, which, on a vote having been taken, was declared carried.

The President called for the report of the Committee on Publication.

The Secretary—I regret to say I have not had time to prepare the report, but I will hand it in for publication.

The President called for the report of the Committee on Topographical Survey.

Mr. Fawcett—Mr. President and gentlemen, I regret to say that I have been unable to meet with any of the members of the Committee. I communicated with each member whose name appears on the list, but received no reply from any except from one gentleman, Mr. Morris, who sent a few suggestions. I did expect to have received from Dr. Klotz a report as to the work carried on by the Dominion on topographical survey, but I did not receive it. I received a report of the posting of the international boundary, which of course could hardly be connected with our work. However, last night I wrote down a few suggestions or ideas which, in the absence of any report, perhaps you will accept, and also Mr. Morris' letter, which was intended as a suggestion. The Secretary informed me that Mr. Saunders in passing through had promised to contribute a paper on this subject, which he expected would be in time for the meeting, but we regret it is not here. (Reads report).

Mr. Ross moved, seconded by Mr. Beatty, that the report of the Committee on Topographical Survey be received and adopted and published in the Proceedings.

The President put the motion, which, on a vote having been taken, was declared carried.

The President—Has Dean Galbraith any information on this subject?

Dean Galbraith—I have no information at all on what is being done at Ottawa. I think you must have heard of the attempt made two or three years ago to organize the survey, but I have not heard that anything has come of it.

The President—There is a certain amount of work going on.

Dean Galbraith—There is work going on under the different departments I believe. I think a meeting of the chiefs of the various departments at Ottawa interested in surveys was held about three years ago, and an attempt made to arrange the work so that it would be properly co-ordinated. At the same time I doubt if anything further has been done. I don't know really whether the work is going on in the old independent way at present or not. It is certainly a matter that is getting to be of more and more importance every year; as the country is more settled, the value of such a survey must become very much greater. It would save a great deal of exploring survey work, and also some final work in the way of laying out railroads, canals, roads and everything else if we had a systematic geodetic survey. Lines could be traced on maps from these surveys that would be very nearly in their true places, if we had such a survey; whereas now everybody interested in any public work of that kind has to make its own surveys, depending very little upon anything that has been done before. I have no doubt they try to get at all the information that is attainable, but it is very likely that the official red tape and so on may interfere with the saving of themselves expense in getting proper information, and the consequence is every survey is carried on very much now as it used to be, independently. A topographical survey would, of course, remove a great deal of the present expense. I am quite sure that this body cannot go wrong in pressing upon those concerned the necessity of making a topographical survey and of having perhaps a Dominion Department, and under it gathering in the Provincial Departments so that all the work might be done. (Applause).

The President—I know as a matter of fact there is work of this nature being carried on at the present time, and I have met people engaged in triangulation work. One point I know is located in Scarboro and another on the Niagara Peninsula near Fonthill. That is a part of the general scheme, but whether it is being carried on continuously or not I do not know.

Principal Galbraith—Is that carried on under the Department of Militia?

Mr. Fawcett—It is under the Astronomical Branch of the Department of the Interior.

The President—The Department of Militia is carrying on a separate survey, and already quite a considerable part of the Province of Ontario has been mapped. They produce very fine maps, but the scale is somewhat small for general purposes—one inch to the mile. The work, so far as I have been able to test it, has been very well done, and the maps are particularly well executed. I believe it is the intention to continue this work and eventually have a system of maps covering the greater part of the Dominion, or at least the more important parts. These maps can be had by the general public at small cost, and are very valuable.

Principal Galbraith—Does the Post Office Department publish any map of that kind—any road map?

The President—Yes, the Post Office Department has its maps showing the mail routes, with the distances from point to point. I believe they are pretty carefully compiled for that purpose, but they omit all reference to contours and elevations which are very necessary for general purposes.

Mr. Dickson—I don't think there is the same necessity at this date for having a survey in this country as existed at one time in the British Isles, but while the same necessity does not exist in all parts of Ontario, there are some parts where it does exist. You are all aware of the fact that it is unique, something you hardly ever see, to find an accurate map of a township that was surveyed previous to, say, the last 45 or 50 years. What has been done since is, you may say, just about as accurate as men are capable of doing their work. Take any of the townships that were surveyed previous to the year 1840 or 1850, and you hardly ever find an accurate map of the township; such a thing is not to be got at all. You can't find one in the older parts of Ontario. I think a survey of this kind is very necessary.

The President put the motion to adopt the report, which, on a vote having been taken, was declared carried.

The President—We will now have a paper entitled "The Mill Lot, Township of Plantagenet," by Mr. E. T. Wilkie. The paper on Topographical Surveys has not yet been received. Mr. Saunders is on a trip to Europe and is going down the Mediterranean. His intention was to mail this paper back, so that it could be used at this meeting, but it has not yet arrived. It may come before the close of the meeting, in which case we will have the benefit of it.

Mr. Wilkie—Mr. Chairman and gentlemen, the paper which I have prepared is very short, and as you will have noticed, I am on the programme for another one, I am almost sorry they did not come together, as they refer to parts of the country which are quite contiguous. This tracing hanging up here is the one I refer to in the paper. I hope you will be able to see it.

The President—Has anyone any remarks to make on this paper, or do you, Mr. Wilkie, wish to ask the members any questions?

Mr. Wilkie—No, I don't wish to ask any questions.

Mr. Dickson moved, seconded by Mr. Sewell, that the paper read by Mr. Wilkie be received and printed in the Proceedings, together with a reduced copy of the tracing.

The President put the motion, which, on a vote having been taken, was declared carried.

The President—We are unfortunate in not having these two papers we had counted on having. Mr. Somerville has not been able to put in an appearance yet. We hope he will be here tomorrow.

The balance of the time at the disposal of the session was devoted to aiding the Committee on Land Surveying to formulate answers to the questions asked, which will be found in their report.

At five o'clock p.m. the meeting adjourned to meet on Wednesday at 10 o'clock a.m.

MORNING SESSION, WEDNESDAY, FEBRUARY 24TH, 1909, 10.30 A.M.

The Vice-President, Mr. L. Bolton, took the chair and called upon Mr. J. McC. Watson to present the report of the Committee on Land Surveying.

Mr. Watson, the Chairman of the Committee, presented the report.

Mr. J. J. McKay moved, seconded by Mr. Speight, that the report be adopted and published in the minutes of the Association.

The Chairman put the motion, which, on a vote having been taken, was declared carried.

Mr. Kirkpatrick—There is a subject, I don't know whether it was taken up this year or not, but I know the surveyors in North Temiscaming, for instance, have brought it before the notice of the Department, that when the authorities are opening up colonization roads they cover up or destroy for miles all signs of the wooden or iron posts. The iron posts are covered perhaps three or four feet deep in the ground, or chucked out, as the case may be. Now, I think if this Association represented to the Minister of Public Works the great necessity when roads are being opened up of seeing that the road overseers, or that some surveyor deputed by him, take bearings from this original iron post to some fixed place on the side, and that such bearings be registered in the Registry Office, then a surveyor desiring to establish a point from that iron post would not be under the necessity of tearing up the road or anything of that kind. He would have the evidence in the Registry Office as to where that post stood with reference to the known point on either side of the road allowance.

Some surveyors have told me that for miles on the boundary between two townships where a road allowance has been opened up there is not the slightest sign anywhere, and nobody knows where the iron monuments have been planted or where a single post has ever stood. How are they then to find out where that original line was? I think if the Association could bring it before the notice of the Minister or Deputy Minister, that possibly some arrangement could be come to that would benefit not only the surveyors, but much more the public and the municipalities interested.

Mr. Watson—I don't think the original blazed line should be allowed to be cut out any place until permanent reference marks are registered.

Mr. Kirkpatrick—But they now ruthlessly destroy them. We had a case of the very same thing up in the Township of Buck. in which a man found the blazes, he put a bottle at the bottom of them, and he was an interested party. Inside of this bottle he placed a paper which said, "This paper is placed in a bottle and planted where the original blazes were," and it was signed by this man; and then a gentleman came to me yesterday and wanted us to write him a letter, stating that that is the official boundary. I can't certify that that is the official boundary. We wrote him, "If the evidence furnished to Mr. Sutcliffe as to the position of that bottle was clear, it might be all right," but I found it was the interested party who did it. I said, "Did he find a line of blazes?" He said, "I don't know." "Well," I said, "how do we know then?" I said the proper way would be for him to make an affidavit as to whether they were placed like the blazes on the other parts of the township; how they were marked; whether they had three blazes, according to the instructions, and how near to one of the blazes he planted that post, and whether there was a line of blazes running along it. I said if that were done and then substantiated by other disinterested parties it might hold good. You all know that after those blazes go, another surveyor who comes along draws a line from the south end to the post at the north end, but unfortunately the lines have a crook, and they do not meet there, and it might take off a lot of a man's clearing. The same thing happened in a mine. A man sunk a mine; the blazes were all cleared away; the lines were drawn straight by another surveyor, and it took part of another man's property. I am writing to another man now, telling him that we can't possibly give an official answer to that. I am writing him a private letter, telling him what I think he ought to do. But interested evidence is not going to have much weight in a lawsuit, unless it is backed up clearly by disinterested evidence. The blazed line is the original line so long as you have got it, or as long as you perpetuate it.

The Chairman—Don't you think it would be better to appoint a Committee of two or three to prepare a memorial to be sent to the Commissioner?

Mr. Kirkpatrick—I think it would be a very good thing; it would clear our skirts; because I know perfectly well that in Northern Ontario the same thing is going to come up. People are wanting roads; they must have them. The first inspector, not a surveyor, who comes along, will tell his men to clear out everything. We have planted iron posts in the centre, and if they are covered up or removed there is nothing left. If it is necessary that they should remove an iron post, it should be removed carefully and planted on one side, and the evidence of that should be filed in the Registry Office.

Mr. C. A. Jones—I think it would be a very good idea to appoint a Committee.

Mr. Kirkpatrick—Mr. Campbell, the Deputy Minister of Public Works, is a surveyor, and Mr. Henry Smith, the Superintendent of Colonization Roads, is also a surveyor, and I should think they would see the absolute necessity of that kind of work, but with their multifarious duties I don't know how they could instruct the local inspectors of roads, who are just picked up in the country.

The Chairman—Probably we can leave the appointment of that Committee until the closing of the session. We have a pretty long programme before lunch.

The Chairman called for the report of the Committee on Repository and Biography.

The Secretary—I have it here. Mr. Esten wasn't able to come, and I will read it.

Mr. Fawcett moved, seconded by Mr. Beatty, that the report be received and adopted and published in the Proceedings.

The Chairman put the motion, which, on a vote having been taken, was declared carried.

The Secretary—Mr. Owen McKay has written to me saying that he failed to get in touch with the members of the Committee on Engineering, but that he hopes before the publication of our Report to send in a proper report in connection with that Committee, so that if someone would propose that this report be taken as read, we can then publish it in the Proceedings.

Mr. Dickson moved, seconded by Mr. C. A. Jones, that the report of the Committee on Engineering be taken as read and published in the Proceedings.

The Chairman put the motion, which on a vote having been taken, was declared carried.

The Chairman called upon Mr. J. W. Tyrrell to read his paper, entitled "Hudson Bay a National Asset." (Applause).

Mr. Tyrrell—Mr. Chairman, I would suggest that the members do not clap too soon, for I feel like making an apology at attempting to speak upon the Hudson Bay question again, because I know it is becoming somewhat of an old story. I have already spoken upon Hudson Bay subjects two, if not three times before this Association, so it begins to look a little as though I didn't know anything about any place else. But, however, Hudson Bay is up again, and with the permission of the Chairman I will read portions of my paper only, because it is of considerable length and I don't want to bore you with the whole of it, but I will read parts which I think will be of more general interest and leave the details and lists of products and so on to appear in the report if the Committee think they are worth printing.

Mr. Tyrrell then read the paper.

In connection with his paper, Mr. Tyrrell said: "I believe York Factory has again been advocated as a preferable terminal point to Fort Churchill, although after making complete surveys of the mouths of both rivers personally I cannot think that the mouth of the Nelson River can, with any reasonable expense, ever become a harbor. We were obliged, in a small vessel drawing a small amount of water, to lie 20 miles off the shore, and even in coming into the mouth of the river in a small sail boat we were stranded high and dry at least ten miles out from the mouth of the river."

The reading of the paper was greeted with loud applause.

Dr. Klotz—Mr. Chairman, I have listened to this paper with a great deal of pleasure. If there is anyone who is competent to give an authoritative opinion upon Hudson Bay, I think it is the speaker who has just addressed us. To me it has recalled the days of 25 years ago. In the first place, it is an interesting thing historically to recollect that it was a French-Canadian who was the founder of the Hudson's Bay Company. In the next place I may say it was a pleasure to me some years ago, when I was on an official visit in England, doing some research work, to see the original charter in Hudson House on Lime Street. What I recollect specially is the seal, which was about the size of my fist, dangling from the charter, in the form of a huge bullet. Referring to Franklin, 25 years ago I made a trip to Hudson Bay, the year Mr. Tyrrell referred to, when Lieut. Gordon was there in May. At Norway House I saw there the thermometer case of the lamented Sir John Franklin. On the expedition of John Rae there were two men with him, John Hector and an Indian Chief named Thomas, when he made the search for Franklin. I recollect Hector told me that they had been sent ahead, and that this Thomas had a great fear of the Esquimaux. The Indians say the Esquimaux stick their tongues through their cheeks.

To come down to a practical point, I fully corroborate what the speaker has said about York Factory. I cannot speak about

Churchill, because I wasn't there, but York Factory is certainly not an available harbor. We came down to the Nelson River and made a survey of it and through Saskatchewan to Winnipeg, and at York Factory I recollect when we rounded the point at low tide we could not see any water. That gives you an idea of what kind of harbor York Factory is. Looking straight out to sea you couldn't see a drop of water. So York Factory I do not think is a very desirable site for a harbor.

I will not take up your time any more. I have been delighted with this address, and as I said before, if there is anyone who can speak with authority upon Hudson Bay, it is Mr. J. W. Tyrrell, and it has given me great pleasure to be present, and it now gives me much pleasure in moving a hearty vote of thanks for the valuable paper Mr. Tyrrell has presented to this Association.

Mr. Dickson—Mr. President, this paper is just another evidence of the fact of how little we know about Hudson Bay and the route to it. I have lived quite a number of years now, and I can remember the time when the idea of having a railway to Hudson Bay was scouted. I remember the time when the Brockville and Ottawa Railway was built from Brockville to Pembroke, and the popular story was they wouldn't earn money enough to pay for the grease for the wheels. That is one of the leading roads in the Dominion of Canada to-day, and one of the leading roads on the Continent of America, and a paying road. I can't recall a single railroad in the Province to-day that is not paying. A few years ago, when the Government first mooted the building of the T. N. O. Railway, the same story was told. Is there a railroad to-day in Canada that is paying a larger dividend than that? If that railroad were extended to Hudson Bay, so that it could meet vessels from England, there is no doubt it would be one of the best paying roads. We are spending some forty or fifty million dollars in building the Trent Valley Canal, that will only be open six or seven months in the year at the most. They are talking of spending something over one hundred million dollars in building the Ottawa Ship Canal, that is only available for a few months in the year.

I think we are very much indebted to Mr. Tyrrell for this very elaborate paper, and I would like to see it published in full, not only in our Report, but in the public press, and in all the leading periodicals, so that the whole country should know it. I would also like that paper to be brought to the notice of the Ontario and

Dominion Governments. I have very much pleasure in seconding the motion.

The Chairman put the motion, which, on a vote having been taken, was declared carried, with applause.

The Chairman called for the report of the Committee on Drainage.

Mr. Newman presented the report.

Mr. Ross moved, seconded by Mr. Newman, that the report of the Drainage Committee be received and adopted, and printed in the Proceedings.

Mr. C. A. Jones—There is one question I would like to ask before that motion is put, to get a little information on the subject with reference to the crossing of railways, particularly under the Ditches and Water Courses Act. Can an engineer award a railway company to construct any portion of the drain beyond the limit of their land, that is, either above or below, or can he only award them the portion across or along their right-of-way? In other words, can he award them to go on to private lands to do a share of their work?

The Chairman—It depends upon whether it is a Dominion or Provincial charter.

Mr. Jones—I think that the Railway Act has done away with that objection about the Dominion or Provincial Act.

The Chairman—That is what the judges maintain.

Mr. Jones—That was the case up to a short time ago, but I think they are in the same position now in that respect, whether they have a Dominion Act or Provincial Act. If there is any one who has had any experience in that I should be very glad to hear their views upon it and their experience in connection with it.

The Chairman—I am afraid we cannot give you any information on that point.

The Chairman put the motion to adopt the report, which, on a vote having been taken, was declared carried.

The Chairman—The next paper is by Mr. Ross, on "Local Improvements."

Mr. George Ross presented and read his paper.

Mr. Tyrrell—I was rather interested in Mr. Ross' statement that he found it more advantageous or economical to have excavating work done by day labor rather than by contract work. I should be glad to know if others have experienced the same. My experience has usually been that men, when they know they are working by the day, do not do the same amount of work for their employers or foreman as when they are on contract work.

The Chairman—Especially if they are working for a corporation.

Mr. Fawcett—The paper contains a great deal of valuable information, and I move that it be adopted and published in the Annual Report, and that the thanks of the Association be tendered to Mr. Ross.

Mr. Tyrrell—I have much pleasure in seconding that.

The Chairman put the motion, which, on a vote having been taken, was declared carried.

The Chairman stated that Mr. Wilkie had asked to have his second paper stand over until the afternoon.

At one o'clock p.m. the meeting adjourned to two o'clock p.m.

AFTERNOON SESSION, WEDNESDAY, 2 P.M.

The President took the chair and said: Gentlemen, time is passing quickly, and we have a pretty full afternoon before us. If you come to order now we will have the paper from Mr. E. G. Barrow on "The Sewerage System, Hamilton, Ontario," which was left over this morning.

Mr. E. G. Barrow—Mr. Chairman, I would like to say that the title is not quite correctly given in the programme. The title is, "The Sizes, Materials and Shapes of Sewers in the City of Hamilton." I hope perhaps on some future occasion to write a paper according to the title in the programme, but I had not time to do that, so I have confined myself to the sizes, shapes and so forth.

Mr. Barrow then read the paper.

Mr. Ross—I think this is a very valuable paper, and I take much pleasure in moving that it be received and printed in the Proceedings and a vote of thanks be given to Mr. Barrow for his very able paper.

Mr. Niven seconded the motion.

The President put the motion, which on a vote having been taken, was declared carried.

The President—The next item on the programme is a paper on "The Road Surface," by Mr. W. A. McLean.

Mr. Selby, in the absence of Mr. McLean, read the paper.

The President—Gentlemen, you have heard this paper. It is now open for discussion or a motion to adopt it is in order if there is no discussion.

Mr. Selby moved, seconded by Mr. Newman, that the paper be received and adopted and printed in the Proceedings.

The President put the motion, which, on a vote having been taken, was declared carried.

The President—We have still a good deal of business on this afternoon, and one very important part of it is to immortalize ourselves by being photographed. The Past Presidents are to be photographed in one group and the members of the Association in another, and copies will be placed in the rogues' gallery of the Association.

The meeting adjourned for the purpose of having the photographs taken.

After the adjournment the President called the meeting to order and said, We will now have Dr. Klotz' paper on "Gravity."

Dr. Klotz read his paper.

The President—Gentlemen, you have heard this paper by Dr. Klotz. It is open now for discussion.

Mr. E. Stewart—I think we have all listened with a great deal of pleasure to this paper. I must say I have had the pleasure of accompanying Dr. Klotz on many occasions to witness the records of the seismograph and I have also had the pleasure of getting from him information in advance of any published reports of certain earthquakes. As to the paper I don't pretend to discuss it. I think probably if I had some little time to look it over I might be able to know something of it but I am not in a position to discuss it. All I rise for is to move a vote of thanks to Dr. Klotz for his very able paper.

Mr. Ross—I have very much pleasure in seconding that.

The President—In putting that motion I would like to say that while the title of the paper did not seem to be very attractive to the ordinary land surveyor a great many good facts have been brought out that we can all understand and there is a great deal of food for thought which we all can profit by when we get a chance to read it and think it over. I think the general opinion is that a surveyor who is satisfied with the "minute instrument" is not always the best man to make surveys with the minute instrument; that if we went a little more into refinement in our theoretical work we would be all the better in our practical work.

The motion was carried with applause and the vote of thanks tendered to Dr. Klotz.

Dr. Klotz—I thank you, gentlemen.

The President called for the report of the Council of Management.

Mr. Kirkpatrick presented the report for the year 1908 and moved its adoption.

Mr. Niven seconded the adoption of the report.

The President—With regard to the matter of contracts, I think that was left over to be discussed under the head of "Unfinished Business"; that is, as to the action that would be taken upon it.

The President put the motion, which, on a vote having been taken, was declared carried.

Mr. Kirkpatrick—I would move that the By-law which was passed on February 25th, exempting from dues Mr. Harry John Browne, of Toronto, which is as follows, be ratified by this Association. (Reads By-law).

You all know Mr. Browne has not been able to do any work, he being a terrible sufferer from neuralgia for a number of years, and I would move that that By-law be ratified by the Association.

Mr. Dickson seconded the motion.

The Presdient put the motion, which, on a vote having been taken, was declared carried.

The President—We will now have Mr. Wilkie's paper on "The Seigniory of Longueuil."

Mr. Wilkie—Mr. President, this is more of an exhibition of a plan than a paper. The paper is very short. It is just a short history in connection with it. The blue print shown is taken from the only record there is of the Township in the Registry Office, and the tracing is one I made from that myself. It is in the County of Prescott, on the bank of the Ottawa River. I might also add in connection with the subject, that in a Ditches and Water Courses case that I was interested in a few years ago, the question came up as to the "seven original lots," and after considerable discussion Judge Constantine took some time to consider the matter and came back with a decision that that section of the Ditches and Water Courses Act did not apply to the Seigniory of Longueuil, as these were not original township lots, there being no survey. He also said something about having a survey made.

Mr. Wilkie then read the paper.

Mr. C. A. Jones—How do they determine their boundaries there?

Mr. Wilkie—They principally come under the Statute of Limitations now. The owners have got them fenced. I never was called upon, fortunately, to make a survey in the Seigniory. The late Robert Hamilton made a good many there, and this is compiled from work he did from time to time, and he had a good deal of trouble. One person came and bought a piece of land from Mr. Treadwell, and he went out and measured it off with a rope or some such device; the next person came along and got a smaller piece and he measured it off similarly, and so on it went. I believe there is no record other than simply that it is there and in the Department here, so far as I have been able to find.

The President—This paper is very interesting; it gives us a record and takes us back to the early history of a part of the Province of which very few of us know much; and I am sure we are indebted to Mr. Wilkie for the information he has given us.

Mr. H. J. Bowman—I move, Mr. Chairman, that a vote of thanks be given to Mr. Wilkie for his paper. I think it is a part of the work that this Association can do, to have papers on these peculiar surveys, so that the generations of surveyors to come may have some little knowledge of how the land has been laid out. There are still some old traditions which can be gathered. Mr. Wilkie has given us some of the early history of this Seigniory, and perhaps there are others in the Province like that. I would like to ask the Director of Surveys if he has a plan of this Seigniory?

Mr. Kirkpatrick—We have got a plan which is not half as good as that of Mr. Wilkie's.

Mr. H. J. Bowman—The Township of Dumfries was laid out by a Scotchman; there is no plan of that; it is a well laid out township, in concessions. The strange thing about it was that the owner of the township, in selling off farms, sold them as lot so and so, but the canny Scotch settlers wouldn't buy the swamps, and he had to survey those out and sell them as so many acres. Some of them are filled with peat, and they will be valuable some day.

Mr. Dickson seconded the motion.

The President put the motion, which, on a vote having been taken, was declared carried.

Mr. Kirkpatrick—There is another survey which would be even more interesting than that; that is the Township of Charlottenburg. It is laid out with all sorts of different concessions and half a dozen different second concessions in the Township; they are described by the Department all right as being in the second concession south of the Riviere Aux Raisin, but it would be in the fifth concession north of the St. Lawrence. In the process of time they dropped out "south of the Reviere Aux Raisin," and they described it as being in the second concession. The poor Registrar put them in the second concession north of the St. Lawrence and so on! Now the Government have been applied to to re-establish a new township there. It has been referred to the Inspector of Registry Offices, Mr. David Guthrie, and he is trying to arrange the matter, and when he does so we will have a very interesting paper for surveyors. (Laughter). I had to prepare a plan for him which took me a very long time. The Council proposed that a new number should be given to each lot and that they should be described in that way. Well, I rather pity the unfortunate Registrar who would have to go through all the books since 1787 and trace out all the grants and transfers that have been made from that time to this. He now simply says, "I am not going to register any more"; and he does not, so the people are at a deadlock; they don't know what in the world to do. They have found a man who thinks he knows most of the locations, and he is going to help the Inspector of Registry Offices. I was very glad it was referred to him instead of to me.

Prof. Galbraith—Whereabouts is this township?

Mr. Kirkpatrick—It is in the County of Stormont.

The President called on Prof. L. B. Stewart to open the discussion on "Tables for Determining Azimuth by the Polar Star."

Prof. Stewart then read his paper.

Mr. Fawcett—I am sure the surveyors are much indebted to Prof. Stewart for this paper, and if the table were enlarged so as to take in the earlier hours, it would be still more useful. I take great pleasure in moving a vote of thanks to Prof. Stewart, and I would like to see this table enlarged and published in our Proceedings. Perhaps Prof. Stewart could provide the surveyors with a table by which it could be applied to the different months without having to get the table as it is issued in the Canadian Engineer each month. Some of us get the Canadian Engineer, but we wouldn't have it with us out on the work, so that we could take advantage of this every month.

Prof. Stewart—I may say in that connection that the table as it appears here could be used indefinitely if it were not for the change in the right ascension and declination of the pole star. If the pole star's right ascension and declination remained unchanged, then of course this table could be used indefinitely until it was found all these azimuths would occur during daylight. The azimuth computed for twelve o'clock in any latitude would, after two months, occur at about eight o'clock in the evening, and two months later, about four o'clock, so that of course they would all occur during daylight after that time.

Mr. Fawcett—The table would be all right for us this time of the year, February; eight o'clock now would be six o'clock two months hence.

Prof. Stewart—Yes. And then of course the table would eventually be rendered useless by the change in the position of the pole star. So it is impossible to produce any table that will be useful indefinitely; and after all, unless one brings out a table periodically, brought up to date, the only other way would be to depend upon the formulæ and tables and ephemerides.

Dean Galbraith—A set of twelve months would do after it is printed.

Prof. Stewart—This table would probably answer approximately for a year hence, but its usefulness would be destroyed by the change in the right ascension and declination of the pole star.

Dean Galbraith—How much would that affect it?

Prof. Stewart—I wouldn't like to say from memory, but the pole star changes its position very rapidly on account of its nearness to the pole.

Mr. Bowman—I take pleasure in seconding the motion made by Mr. Fawcett. It has been running in my mind about the table supplied by the Department of the Interior in the Northwest. The Surveyor-General supplies a table good for three months. I think when they first came out they were good for six months. They didn't require to be quite so accurate then. I found that a very handy way of making observations, and there was one beauty about it, that it was the only way that would be received. It seems to me the surveyors have too many ways that they know little about for taking azimuth observations. It is all right enough for one having the mathematical and astronomical knowledge of Prof. Stewart to investigate all these different ways, but it seems to me that it would be better to adhere to one way, say the same as that in the Dominion Manual, and have it required by the instructions that the notes shall be returned with that particular method of taking azimuth. We used to think when we were at school the sun was a pretty good thing to take. Students take the sun, and after experimenting around a while they give the sun up as a pretty unreliable fellow, because too many little things come in and the observations are not apt to be very accurate. So that the method that has been adopted for surveyors in the Dominion is a capital one, by supplying them with this table. You require to have a sidereal watch, but after all a common watch will do. I used to have a $10 watch, and it answered very well. It has had to be regulated to go three minutes 56 seconds faster every day than the ordinary time; and this table of stars is obviated by giving the altitude of the stars that would cross the meridian. You know pretty well what your meridian is. If you don't, you can get it pretty closely from the north star at night in a rough way, and you are given the time at which a star at a certain altitude will cross the meridian. You do not know just what the period of the star is at all, but you simply get ready for it on the meridian and at the altitude for that latitude, and there the star is, if you are on time for it. You get there a few minutes before and the star flashes by, and you correct your time, which you probably have within a minute or two. You can correct your sidereal time every night if you like at your camp. I find it very easy in that way to keep the sidereal time, as long as you are not in smoke, and even then by waiting till the stars come out at night you could find it.

It always seemed to me the Ontario Survey Department could do the surveyors a good turn by supplying a similar table. In fact, our Association had a table printed a couple of years ago that was something like the Northwest table. But of course a table to be simple has got to be issued every few months. There should not be any great difficulty in adopting Captain Deville's table for these new townships to be surveyed north of the 49th parallel. In fact, a friend of mine was going out as an assistant on a survey, and he happened to be near the 49th parallel, and I had no difficulty in figuring out for him what the azimuth would be at certain times, and showed him how to keep the sidereal time.

Unfortunately he got into the water and got his watch spoiled and he hadn't any watch for the sidereal time, so he had to fall back on the old method of elongation. I think it would be greatly in the interests of surveyors if they had the simple method that is employed in the Northwest.

The President put the motion, which, on a vote having been taken, was declared carried.

The President—Mr. Stewart, I have much pleasure in tendering to you the thanks of the meeting for the explanations you have given us.

Prof. Stewart—I thank you.

5.30 p.m., adjourned to meet Thursday, February 25th, at 10 o'clock a.m.

MORNING SESSION, THURSDAY, FEBRUARY 25TH, 1909.

At 10 o'clock a.m. the President took the chair and called the meeting to order.

Mr. T. B. Speight's paper on "The Equipment and Management of a Party on Township Outlines" was presented and read. On the motion of Mr. Dickson, seconded by Mr. Bolton, Mr. Speight's paper was accepted and ordered to be printed in the Proceedings.

(The motion was put to the meeting and carried).

Mr. J. F. Whitson's paper on "The Future of Surveyors in Northern Ontario" was then called for.

Mr. J. F. Whitson—I regret very much not having my paper written out; I was called away from the office for a few days, and what I have to say now must only be considered an outline.

My idea was to speak on this question more for the encouragement of the men who are now entering the profession. We have a large area in Northern Ontario unexplored and unsurveyed. There are in all about 140,000,000 acres; of this only about 42,000,000 acres are surveyed; with the addition of the northwestern part of Keewatin, we will have an additional area of 146,000,000 acres to explore, and, if found valuable, to survey. I think that the future of surveyors in Northern Ontario is largely in the hands of those who are now entering the profession. The day is past when a man can call himself a surveyor when he is only able to run a transit or handle a level. I have been very much struck with the work going on in Northern Ontario in connection with water powers especially, and it is surprising how few of our surveyors are reaping the benefit from this class of work that they should.

In the development of the water powers which is taking place in that country, and which will progress more and more, there seems to be an impression that the man who has got C. E. attached to his name from New York, Rochester, or even Buffalo, is the man who is being employed in Northern Ontario to develop those water powers. I think that the surveyors should be able to take hold of this class of work. It does not require a great deal of extra study to be able to calculate accurately the amount of power that can be developed from a waterfall, the amount of land required for the necessary works, and the area which will be flooded.

Another point which it struck me might be looked into in connection with our examination is the study of geology; our papers at present are theoretical; very few of the younger men, except those from the School of Science, have any knowledge of mineralogy, and even they are sometimes unable to distinguish one specimen from another. I think it would be a very good thing if the examination in geology were made more thorough.

Again, in connection with the study of forestry, it would be of great advantage if surveyors were able to estimate more closely the quantity of timber that might be grown on an acre of land in the country passed over by them, the value and character of the timber. As there are questions coming up in connection with the revision of our Act, I do not think it is necessary for me to say anything more. Our Survey Act requires a good deal of amendment, as the surveyors in Northern Ontario are laying out mining claims. There is nothing sufficiently definite as to the manner in which they should lay them out, and it generally throws discredit on a surveyor if his survey is rejected. Now, I think in the interests of surveyors, mining men and the public generally, it would be well if we could amend the Act so as to make the meaning more definite. These are all the remarks that I propose to make; if opportunity occurs to put my ideas into better shape, I shall be glad to do so.

The President—This address is now open for discussion; we rely upon Mr. Whitson to put the paper into shape, and it will be one that we can readily endorse.

Having the rudimentary estimation of water powers included in the examination of surveyors of Ontario seems to me to be a very reasonable thing. The surveyor goes out as the first official who has been through the country, but the water powers, a very valuable asset, is untouched by him; it seems only reasonable to require a candidate to have sufficient knowledge to make estimates of water powers for the purposes of the Department. If the Association sees fit to recommend an alteration in the statute to include this. I have no doubt the Legislature will give it consideration.

Mr. Whitson—I think that there would be no difficulty in getting the sanction of the Legislature to any such change now. Under our present regulations all surveys of water powers are to be made by a duly certified land surveyor. A surveyor should have some idea as to what lands would be required for the construction of dams and power houses, and also be able to estimate the flood area. In the preliminary survey he is required to report to the Government on this scheme of development, the quantity of land that would be flooded and the damage that would take place. Generally speaking, the man who has made the first survey would be called upon by the lessees to develop the power, if they considered his original scheme a good one. It is to be deplored that nearly all of this work goes out of the hands of the surveyors of Ontario, and goes into the hands of men who are less qualified. I have been out on the Montreal River and I have found young boys from Buffalo in charge of development work; I do not believe they ever put in a dam in their lives, but because they were posing as experts from New York, Canadians seemed to think that they had greater knowledge than ourselves.

Mr. Fawcett—As an Association, we have been very much indebted to Mr. Whitson for valuable papers during many years past, and the paper which he has now given us contains very valuable points for the surveyor. I concur entirely with his suggestions as to the enlargement of the sphere of the surveyor. Having had several years' experience on exploratory work myself, I know my reports would have been more useful had I been better fitted to report all the different features of the country, including water powers and timber. Of course, as a man brought up in the woods, I could generally report fairly well on the timber, but I think if a surveyor were thoroughly equipped when he started out, he could give a much more valuable report on the work. Someone said that he was born forty years too soon; I feel somewhat that way myself; even at this age I feel that I would like to undertake exploratory work again; the fire is still in my blood, although I know I am too old for that kind of work.

I think the thanks of the Association are due to Mr. Whitson for what he has done for us and for his present paper, which I am sure will be very valuable.

Mr. Fitzgerald—I have much pleasure in seconding the resolution. I think the surveyors of this country are a good deal to blame for the young men who come from Buffalo and New York; surveyors hold themselves too cheap altogether, and that is only what may be expected when we have a place like this to meet in;

some Committee should be appointed to wait on the Minister of Public Works, and see if we could not get some decent quarters in the new addition which is being made to the Parliament Buildings. If it were possible to get this Committee to meet the Minister, we could possibly do something.

The Chairman—It is moved by Mr. Fawcett, seconded by Mr. Fitzgerald, that Mr. Whitson's paper, when revised by him, be published in the Proceedings. Carried.

Mr. Wilkie read the Auditors' Report.

On motion by Mr. Selby, seconded by Mr. Sewell, this Report was received and adopted. Carried.

The Report of the Committee on Legislation was presented by Mr. Kirkpatrick.

Mr. Kirkpatrick—I will read the Report as we have it; it proposes some amendments to the Survey Act, and if it meets with the approval of the members we can put it into the hands of the Law Clerk to put it into shape. The object of the Committee has been to simplify the method of subdividing lots. Some surveyors have followed one and others have followed another method, and several points, particularly as to aliquot parts of lots that we have taken up have been fruitful sources of diversity of opinion among the surveyors as to how they wish it done, and some arrangement should be reached that will make it perfectly clear how the lines should be run; of course, it will not be retroactive; where the people are settled and the title is arranged we do not propose to disturb it, but it has been thought that if we can simplify the Survey Act and make the practice universal, that it would be more conducive to the public interests, as well as to those of the surveyors themselves, than the present way of surveying the whole lot and then giving the exact half of it. If the proposed method is adopted it will simplify matters.

I do not know that it would be an advantage to rescind that section in the Survey Act, Section 19. (Reads Section 19). That is the practice that has been almost universal except in double front townships where the Act expressly provides that the half lots shall be bounded by a line in the middle of the concession; that was determined by the Act where the lots have been described in half lots; the old-fashioned way was to describe the north half and the south half, practically giving the same area; because of course the Government did not know that there was more or less than 200 acres in the lot; there might have been 220 or more. You will scarcely ever find a lot on which there is exactly 30 chains on each front. I think this clause would have to remain.

(Referring to sketch of 1800 acre block). These lot lines are all intended to be due north, but if the east boundary is not exactly due north, therefore the line they would have to run would actually cross the governing line; the west line in this case would be the governing line, and these lines here (showing) would have to be drawn on the plan due north and south; that would not do at all. That is a thing that sometimes we have trouble about when the boundary line is crooked, not so much in the nine-mile-square townships. We often have the six-mile townships where the east boundary is not a north and south line at all, and when a surveyor goes in and tries to draw a plan of that he is giving the next man much more or much less than he should get. Now, by the proposed method you divide up the frontage and run the line due north in order to divide it into east and west halves, and if you want to divide it into north and south halves, chain the two sides and draw a line from middle point on side limit to the middle point in the opposite side.

The Chairman—The question has arisen whether that would be considered a case of lot lines "not being intended to be run on the same course as the boundary from which the lots are numbered." Take the case of a township that has been subdivided and the block outlines surveyed. The plan shows that none of the outside limits are true meridians; how would you run the intermediate lot lines in that case?

Mr. Kirkpatrick—Supposing the line was five or six minutes out of due north, you would not run due north, but on the course of the governing line.

The Chairman—The lines between lots not run were supposed to be due north, and it might very easily happen.

Mr. Kirkpatrick—If you get hold of a surveyor's plan you could not tell whether he drew this line intending it to be parallel to that line or not.

The Chairman—Is there any way in which we can make it clear when we should change the governing line from the east to the west side of the block?

Mr. Whitson—Suppose the bearing is given and is north 1 degree west, all the lot lines in that section will be run on that course. Otherwise, if there was a difference between this bearing and that bearing, one north three minutes east, and the other north three minutes west, you would make two irregular lots in that block, unless it is shown clearly by the plan that that line is not intended to be the governing line, or the bearing that is given is to govern, whether it is exactly on the course as given on the instructions or not.

The Chairman—We have to deal with the plan and the field notes as we find them on record.

Mr. Whitson—This will be confined altogether to the new system; bearings are to be given for every line, and not as under the old system, where bearings were attached to the outside lines and it was assumed that the others were the same.

The Chairman—Is that the case in the six-mile townships?

Mr. Whitson—No, the bearing is found on the middle line of the township.

Mr. Kirkpatrick—Surveyors like to economize work on the plans, and they just put the bearings on the middle lines, not on the others.

Mr. Whitson—That section might be made stronger and clearer; it might be said that the governing line shall be on the same course as given on the plans and field notes, unless distinctly otherwise stated.

The Chairman—That would remove the doubt, and I think we ought to work for that; it is a slight change, but it would clear up a great deal of difficulty.

Mr. H. J. Beatty—Is it the intention to make the line divide the lot, by a line astronomically parallel to the boundary?

Mr. Kirkpatrick—Yes.

Mr. H. J. Beatty—And what about the line dividing it into north and south halves?

Mr. Whitson—Run it to connect the middle points on the boundaries.

Mr. H. J. Beatty—Why not the other one the same?

Mr. Whitson—It sometimes happens that a lot may be wider in the rear than in the front; and this line might not be straight; there might be a bend in it, and you would have to chain through that piece up to wherever you find the line.

Mr. Beatty—You get nearer to the east and west halves of the lot.

Mr. Kirkpatrick—I think we had better deal with this report clause by clause, and I will read Clause 1. (Reads Clause 1). Now, what do you think of that?

The Chairman—Is that satisfactory to the meeting? Carried.

Mr. Kirkpatrick—(Reads Clause 2).

Several members—That's all right.

The Chairman—Carried.

Mr. Kirkpatrick—(Reads Clause 3).

Mr. Whitson—That is applying to the six-mile section, and might be made so it would apply to this section. That was one of the questions we considered and one which we found we had most difficulty in arriving at a unanimous opinion on; our Committee was pretty well divided on that point; the most experienced men on the Committee want it. Suppose this is a block a mile square, and this post (showing) has become obliterated, also the line for some distance is lost, some of the Committee held that we should chain from the north and from the south and divide the distance according to the field notes; others held that we should connect the posts of each side, and that at the intersection would be the angle of the section.

The Chairman—We had that very thoroughly discussed and rather extreme cases were given us; several of us thought that the depths of the concessions should be divided proportionately. Of course, there is no doubt but that you could get an extreme case in the other direction; it is now necessary for us to fix it definitely in some way.

Mr. Smith—Suppose one side of the concession was found to be two or three chains longer than the other; you would have a little bend in one side that was never intended.

Mr. Whitson—Not if you have a "shouting man" on the corner and he has "shouted" the line in for ten chains, say to here (showing), and you find two blazes, one on each side of the intersecting line; then you can find the true line.

Mr. H. J. Beatty—There would be no limit as to where you should go for blazes on that side road.

Mr. Whitson—No limit.

Mr. H. J. Beatty—Take the case where both lines were "spliced" in, and you find one line on the ground fairly straight; the other line is obliterated and you cannot find it; then you chain across the original line and take the intersection, and let it go at that. I do not know about that; there is a mistake either way.

Mr. Whitson—I think it is about even; but in one way you get a straight concession line, and that means a good deal to the public, especially in level country.

The Chairman—There are extreme cases that would occur; nearly the whole length of the concession line might have been fire-swept, and all the original marks gone; whereas there might be blazes on the side line, and again, an opposite set of conditions might exist. It is not expressed in the statute, but we have assumed that the intersection of the lines is the method of finding the lost corner.

Mr. Smith—That is the practice.

The Chairman—Yes; but we want it fixed by statute.

Mr. Whitson—It is the practice in some cases, but not in others.

The Chairman—We want to fix it definitely in some way.

Mr. Smith—I had some townships along the C. P. R., and if I had followed that I would never have got them done.

The Chairman—If you had been pressed in court you would have found difficulty in getting any authority for your survey.

Mr. Smith—I find intersection the best way.

The Chairman—That is the way I was taught when a pupil, but it has been always a poser to me when my pupils asked me why we intersect instead of dividing, as the statute seems to say; that intention was never expressed by the statute as far as I can see.

Mr. Smith—My idea was that the legal way of finding the lines on the ground is to connect the nearest undisputed points.

The Chairman—You can apply the other principle, that is, that you must divide between known points.

Mr. H. J. Beatty—Did the Committee consider the proposal to divide both the concessions and side roads according to chainage?

Mr. Whitson—There are a great many points given there, and we did not, in the Committee, have the mature judgment of Mr. Kirkpatrick upon them; he probably knows what the intention of the Act really was; whether the idea of this block system was that these concession lines were true or not.

Mr. Kirkpatrick—That was the whole idea of that system; it was to make each section like a little township of its own; there was to be a governing line and all the other lines were to be run by it. But if you lose an intersecting point, how are you going to get it; one surveyor will do it one way, another will adopt another way; if we put it in statutory form we will have statutory justification for what we do; the man who does it according to the statute will have the best of it when he goes into court. Suppose the whole of both side lines are lost; you will have to go to the base here and there (showing), and yet this is not a straight line; this is the nearest undisputed point. If you find blazes anywhere near it, it saves you going all the way from the concession and running the line down. If you do not find these you have to go to the extreme ends of the concession and run the line.

Mr. Smith—I find one section 360 feet too wide and another section 360 feet too narrow. In the Township of Burton I traced the lines across and got the intersection, and I had a base of 320 feet and a perpendicular of 300 feet, and the hypotenuse gave me my solution.

The Chairman—Is that clause passed? (A vote was taken and the Chairman declared the clause carried).

The Chairman—That is the principle of intersection, not the principle of division.

Mr. Smith—Yes, that is right.

Mr. Kirkpatrick—(Reads Clause 4).

A Member—In laying out aliquot parts of a lot, you run an astronomical line as given in the field notes?

Mr. Whitson—Yes, that is the way.

A Member—Then you will have two gore lots in a block; Lot One as well as Lot Six.

Mr. Whitson—That is referring to the 640 acre blocks.

The Chairman—They might both be gore lots; the boundaries might not be actual meridians.

Mr. Smith—The same as is now used in the Muskoka country?

Mr. Whitson—Exactly the same.

Mr. Smith—Well, I think that's all right.

Mr. Whitson—That expresses also the division of the front of the lot, not as it is on the ground, but as it is in the field notes.

Mr. H. J. Beatty—Is that wise?

Mr. Whitson—No, that is better by chainage.

Mr. Kirkpatrick—(Reads Clause 5).

Mr. Whitson—The north and south lines shall be parallel to the governing line, and on the same astronomical course, and in dividing the north and south halves take the two midway points.

The Chairman—Would it be necessary to alter the section relating to aliquot parts?

Mr. Kirkpatrick—That might be left.

The Chairman—It will be rather confusing to those reading the Act.

A Member—Does that rule cover any aliquot part?

Mr. Kirkpatrick—Any aliquot part.

The Chairman—This method is meant to apply to subdivisions in all systems of survey.

Mr. Whitson—We could make it apply to all aliquot parts; the idea is all right.

Mr. Kirkpatrick—Make it "any" aliquot part instead of "an" aliquot part.

Mr. Kirkpatrick—(Reads Clause 6).

The Chairman—Does that cover single front concessions?

Mr. Whitson—This is 640 acre blocks.

The Chairman—Couldn't we make a general section covering single front concessions? There is now no authority for the course of the line between halves.

Mr. Whitson—This last clause I think is one of the most important; it is the location of the line between the east and west halves of the lot by midway points; under this system there are so many that will be run on different bearings; in the 1800 acre blocks surveys have been made more correctly and there will not be that difficulty.

A Member—Both front and rear?

Mr. Whitson—No, only in front and then parallel to the governing line.

Mr. Sewell—I think that is right.

The Chairman—Has anyone any objection to this clause? Carried.

Mr. Kirkpatrick—In single front concessions it is proposed to make it clear that in laying off an aliquot part of a lot, the line shall be parallel to the governing line, or to the front of the concession, as the case may be.

Mr. Whitson (shows plan of single front concession)—The difficulty arises as to how the line between the north and south halves should be run; it is now proposed that the line between the north and south halves shall be a line parallel to the front of the concession.

Mr. Smith—Measuring across on each side line?

Mr. Whitson—No; at such a distance from the front of the concession as will divide the area equally. There would be little jogs in the middle cross lines, but they would be parallel to the front of the lot or to the concession.

Mr. Smith—That is the most important boundary, the front of the lot.

The Chairman—That was the opinion of the Committee.

Mr. Kirkpatrick (reads Section 19 about aliquot parts)—I am going to add in here, "except as hereinafter provided."

The Chairman—That is to modify the old section as to aliquot parts. An aliquot part still means an aliquot part.

Mr. Whitson—In the Act as amended in 1897, referring to the running of lines in 1,000 acre blocks, it was provided that in the event of a line having been run previous to July, 1897, you should resort to the old method of getting up the boundary of the section and running the line parallel to that; I think that should be in the concession instead of in the block.

The Chairman—I think that was the intention of the Association at the time the change was made, but it went in as "section" instead of "concession."

Mr. Smith—How were you going to know when the line was run?

Mr. Whitson—The difference now is, that now you have only to look for the line in one concession instead of in two concessions. If the line is given as north in the field notes and it is actually north 10° west on the ground, one line will cross the other; and the owner of the next lot is going to suffer. I do not think any change should be made in that.

Mr. Smith—How are you going to know if the line that you find on the ground is a regular surveyor's line, and parallel to the governing line?

The Chairman—I think that is a difficulty which will arise only occasionally.

Mr. Smith—You know what old timber lots are; I have crossed them time and again, and I certainly would use my judgment.

Mr. Whitson—I think it would be a great hardship if that clause were amended.

Mr. Kirkpatrick—I think there would be a good many cases in which that line had been run and the settlers had settled according to it, that there would be a hardship. It was the intention to prevent any man suffering loss.

Mr. Whitson—It is agreed then that that clause be changed.

The Chairman—That is, to make the word "block" read "concession." Carried.

There are two other points that the Legislative Committee would be expected to deal with. One is a communication from a gentleman interested in the working of the Drainage Act, as to the propriety of the Official Referee being the supreme authority on the engineer's fees. I had a communication which I did not read very thoroughly; it was by way of complaint against the action of judges in cutting down engineers' fees.

Mr. Smith—My experience of the Ditches and Watercourses Act is that it is productive of much legal hair splitting.

The Chairman—(Reads letter referred to).

Mr. Kirkpatrick—All that would be required would be to change the words "County Judge" to "Official Referee." I think that would probably strike the Attorney-General as reasonable.

The Chairman—There might be some objections by the Councils.

Mr. Smith—I knew one case about five years ago; the reports were in for some time, but there were reasons for postponing, and new Councils came in who knew nothing about the matter, and the thing dragged on for a long time. I think the County Judge is a very poor authority to leave a question of that kind to; it ought to be referred to the Official Referee.

The Chairman—Perhaps someone can tell us if there is any reason why we should not ask to have this change made.

Mr. Fitton—It seems to me that is right.

Mr. Dickson—I agree with that.

Mr. Smith—There are a great many men who are on those Councils who are there on a cheap scale, and all their pressure is brought to bear on the County Judge, and it seems to me that the Referee is the only person who should be empowered to deal with these cases.

Moved by Mr. Dickson, seconded by Mr. Smith, that this meeting is in favor of changing the tribunal before whom questions of engineers' fees under the Drainage Act are to be settled, from the County Judge to the Official Referee.

(The Chairman put this motion to the meeting and declared it carried).

Mr. Smith—Would it be in order to say anything in the Ditches and Water Courses Act about the Referee? My experience is that the County Judge at once constitutes himself an engineer; he does not like to have his word set aside, and the question is being tried by a judge who knows nothing of drainage matters.

Mr. Dickson—The County Judge knows how to fix the fees of his brother lawyers, though.

Mr. Smith—The Ditches and Water Courses Act is just simply public robbery on their point.

Mr. Dickson—I think the less the County Judges have to do with some of these things the better.

Mr. Smith—Would it be possible for the County Judge to appoint some engineer to look into the matter.

Mr. Dickson—I would prefer that even to the referee.

Mr. Whitson—Leave it to an engineer to fix the costs.

The Chairman—I do not think you would get that.

Mr. Smith—In disputed cases have a third engineer to report on the case to the High Court; it could be arranged that the same engineer could report on the question of costs to the same authority.

The Chairman—I am afraid the members of the Trades and Labor Council have not the same confidence in us. There is another point respecting the time in which the reports are to be brought in. (Reads clause in letter).

Mr. Whitson—Isn't the surveyor always at liberty to make an agreement with the Council?

Mr. Smith—Not always.

The Chairman—That doesn't seem to come before the referee.

Mr. Dickson—I think this question should be decided by some member of the profession.

Mr. Smith—I know several men in the profession, and any drainage question would get a fairer trial before them than before any County Judge.

The Chairman—Will you make a motion, Mr. Smith?

Mr. Bowman—I think that the 30-day limit should be extended; we often find it difficult to get the awards in.

Mr. Smith—I am not speaking of the 30-day limit under the Ditches and Water Courses Act; it is the six months' clause under the Drainage Act.

Mr. Bowman—You can usually get the Council to extend the time.

Mr. Smith—Sometimes you can, but I know a case where they did not, and took an unfair advantage of an engineer, and meant a loss to him of $60 or $70. The only person to whom we ought to go is the referee.

Moved by Mr. Smith, seconded by Mr. Dickson, that in the case of any dispute between the Municipal Council and any engineer as to the fees to be paid or as to the time allowed for filing a report under the Drainage Act, such dispute shall be referred to the Official Referee under the Drainage Act, instead of to the County Judge, as at present, and the Legislative Committee be and are hereby instructed to obtain the necessary change in legislation. Carried.

The Chairman—Arising out of Mr. Whitson's paper, shall we suggest that candidates be examined as to their knowledge of water powers?

Mr. Kirkpatrick—We are examining them on this subject now.

The Chairman—Have we the authority?

Mr. Kirkpatrick—I do not know; they have studied it. At a recent examination a few of them were a little crude; in one question the majority of the candidates arrived at the same amount of horsepower; one got 183; the majority got 8,300, but one put it at 4,000.

Mr. Whitson—It would give us some standing in that particular branch of surveying.

Mr. Smith—You propose to make it a matter of final examination; I think that is a very good idea.

The Chairman—It does not seem a fair thing to a candidate to give him no notice of a new subject of examination.

Mr. Whitson—If you amend the Act, what about forestry?

The Chairman—Change the name of the Botany subject.

Mr. Whitson—I think that forestry should be added for this reason; I do not know that the subject you now have includes the measurement of timber and logs. That is of very great importance in making a report on the value of timber in a township.

The Chairman—I think we have the statutory authority for that. The Council can pass a by-law giving details of this subject, and it can be ratified next year. I do not think we need disturb the Act for that. We will not likely require to have changes made in the Survey Act next year, unless something of vital importance comes up.

Mr. Smith—Can we not do something to approach the Board of Railway Commissioners and insist upon the field plans being signed by an Ontario Land Surveyor to guarantee their accuracy?

Mr. Whitson—The registry offices won't accept a plan unless it is signed by an O. L. S. Surveyors have without personal survey been signing plans for a few dollars.

The Chairman—I think we have machinery to deal with such cases.

Mr. Smith—I have heard engineers say, "I will get my O. L. S., so I can sign plans."

Mr. Whitson—It is hard work to try to get legislation that will prevent an engineer from signing plans of land surveys.

Mr. Smith—I think we should prevent this careless signing of plans.

The Chairman—We have power under the by-laws for the disciplining of our members; if a member has committed any actual breach which requires him to be brought before the Council, I think the Council will take action; in fact, action has been taken before now; the delicate part is that a surveyor does not like to be the accuser.

Mr. Smith—If there had been an inspector, I would simply give him a pointer and let him go ahead.

The Chairman—I remember a case of an engineer, an O. L. S., on the Transcontinental Railway, who was asked to sign certain plans, and he said he would when he had verified them, and not before.

The meeting then proceeded with the election of officers.

The Chairman—I have some reports here which have not been presented yet; they are, the report of the Committee on Polar Research, the report of the Committee on Entertainment, and the report of the Committee on Publication. Will some member move that they be taken as read and printed in the Proceedings.

Mr. Dickson moved this resolution, seconded by Mr. Speight, which was carried.

The Chairman—There is a paper on Drainage, by Mr. Code, which we have not had time to hear.

Mr. Sewell moved, seconded by Mr. Dalton, that this paper be received and printed in the Proceedings. Carried.

The Chairman—There is also a paper, "Topographical Surveys," and another on Professional Status, both by Mr. Saunders.

Mr. Speight moved, seconded by Mr. Esten, that these papers be received and printed in the Proceedings.

The nomination and election of officers was then taken up.

ELECTION OF OFFICERS.

For the office of President, Mr. Bolton was nominated by Mr. Dickson, and seconded by Mr. Sewell, and declared elected by acclamation.

For Vice-President, Mr. Selby was nominated by Mr. Dickson and seconded by Mr. Fitton, and declared elected by acclamation.

For Secretary-Treasurer, Captain Killaly Gamble, nominated by Mr. Kirkpatrick and seconded by Mr. Wilkie, was declared elected by acclamation.

For Auditors, Messrs. Wilkie and Ward were elected, being nominated by Mr. Kirkpatrick and seconded by Mr. Bowman.

For members of Council. Mr. Niven, nominated by Mr. Wilkie; Mr. H. J. Beatty, nominated by Mr. Speight; Mr. J. McC. Watson, nominated by Mr. Dickson; and Mr. J. Hutcheon, nominated by Mr. Kirkpatrick.

The President appointed Mr. H. L. Esten and Mr. W. A. McLean Scrutineers of Ballots.

The Chairman—We have now a very decent bank balance and can afford to provide ourselves with better rooms than these, and I believe that we are not altogether welcome here.

Mr. Dickson—Are they going to charge rent for this?

The Chairman—We pay $12 a year to the janitor.

Mr. Dickson—Oh, stay here till they order us out.

The Chairman—Is it the desire of the Association to hold our meetings here or elsewhere? Our attendance is better in this building, and some of the officials cannot leave here to go down town for meetings.

Mr. Selby—Is the new addition to the Parliament Buildings to be built?

The Chairman—There is a library in contemplation.

Mr. Selby—We are not sure if quarters can be got when the new buildings are completed.

The Chairman—A very important point has been discussed, and that is, that the date of the examination and the date of the Association meeting should be at least a week earlier; it has happened frequently that our dinner occurs on Ash Wednesday, and a number of the members have objections to taking part in a dinner on Ash Wednesday. Now, when the statute is being changed, we have an opportunity to alter these dates.

Mr. Kirkpatrick—I will move that the Legislation Committee be instructed to place these dates on the first Monday and the third Tuesday, respectively, instead of the second Monday and the fourth Tuesday in February.

This motion, in the following form, was moved by Mr. Kirkpatrick and seconded by Mr. C. A. Jones: That the Committee on Legislation be instructed to ask the Legislature to change the Act whereby the date of the examination will be the first Monday instead of the second Monday, and the date of the Annual Meeting of the Association will be the third Tuesday instead of the fourth Tuesday in February. Carried.

Moved by Mr. Dickson, seconded by Mr. Kirkpatrick, that the Association grant the Secretary-Treasurer the sum of three hundred dollars, as a slight recognition of his services during the past year. Carried.

Moved by Mr. Speight, seconded by Mr. Hutcheon, that the sum of five dollars be granted to each of the acting Auditors. Carried.

Mr. Dickson—I would like our President to leave the chair, and Mr. Kirkpatrick to take it.

This having been done,

Mr. Dickson—I have much pleasure in moving a very cordial vote of thanks to our retiring President for the able manner in which he has discharged the duties of his office during the past year.

Mr. Sewell—I second that.

Mr. Kirkpatrick (in the chair)—Is it your pleasure, gentlemen, that a hearty vote of thanks be presented to our worthy President who has just retired, for his attention to our affairs and his uniform kindness and courtesy during the past year. Let us have a standing vote. (The members rise).

Mr. Van Nostrand—I appreciate very much this tribute that has been given me, but I feel that I have not altogether deserved it. It is not necessary to detail the numerous occasions in which I have felt that my duties demanded more attention than I have been able to give them, but I assure you that it has been a great pleasure and I consider it a distinct honor to hold the position that you were kind enough to give me a year ago. It will be quite as much a pleasure to step back and serve in the ranks again, and my interest in the Association will be quite as pronounced as it was in the past.

On motion by Mr. Dickson, seconded by Mr. Speight, the meeting adjourned.

PRESIDENT'S ADDRESS.

To the Members of the Association of Ontario Land Surveyors:

Gentlemen,—It gives me much pleasure to have the privilege of welcoming you to the seventeenth Annual Meeting of the Association of Ontario Land Surveyors as a corporate body, or the twenty-fourth Annual Meeting of the Land Surveyors of Ontario as a united body of men whose aim is to promote the interests of their profession by the interchange of ideas.

Since we last met the world has seen many changes, the saddest of all being the disaster which overtook our fellow beings in Sicily and within a few hours gave a shudder of horror to the whole of the civilized world. The advancement of science and human invention, however. did much to mitigate the sufferings of the survivors, as the cry for aid was at once transmitted by electric despatches to every part of the habitable globe, and never was the sweetness of human sympathy better exemplified than by the prompt response from all creeds and nations.

Another instance of the progress of science was witnessed in the case of the recent collision between the steamships Republic and Florida when the Marconi system—which but yesterday was regarded in the light of a tale from the Arabian Nights—was the chief agent, ably seconded by the submarine signal system, in averting what might have been one of the most awful disasters in the history of navigation.

Among other notable events of the year which concern us directly as Canadians was the Tercentenary celebration, held at Quebec, in August last, which showed our young nation to be a close union of races forming a most important unit in the great empire to which we are proud to own allegiance.

In our own Province we have seen inaugurated a policy of administering our mineral assets for the benefit of the people at large, the natural heirs of the natural assets of the country, instead of solely for the profit of the fortunate few, as has been the custom of all countries in the past, and this has been effected without entailing hardship on those whose capital and energy have been devoted to the development of our resources.

The husbanding of our timber resources has also become, not only a national but a patriotic subject, and wilful waste of the products of the forest is regarded by all thinking Canadians as an offence against themselves, both collectively and individually. While in the past, the disastrous results of forest fires occasioned by carelessness was lightly passed over by those not immediately affected, any person now guilty of causing fires is deemed a felon by all right minded citizens.

By the recent division of the unoccupied territory in the northern part of the Dominion a considerable addition has been made to the area of Ontario, and its exploration in the near future must fall to such members of this Association as may be considered by the Cabinet best fitted for the task. Those of us who have had little or no experience in surveys in the wilds have but a slight conception of the responsibilities devolving upon the surveyor and the dangers to which he and his party are exposed, when he enters upon a work of this nature, trusting in Providence to guide his ripened experience and cutting adrift from all extraneous aid for months at a time.

Our relations with our brethren, the Engineers, continue cordial and there is every reason that they should long remain so. At a recent gathering of members of the Canadian Society of Civil Engineers, I was agreeably surprised to note amongst their prominent members the familiar faces of no fewer than four of our own past Presidents, and, in addition, at least half a dozen others whom we all are proud to include in our list of members. It is to be regretted that up to the present, that Society has not succeeded in obtaining statutory recognition of a standard to be required of every man who seeks to practise as an engineer. Apart from the fact that the professions are already robbing the community of many whose energies and capabilities would be of more service as direct producers, the public safety demands that those entrusted with public works shall have shown themselves capable of ensuring that safety. While the keeping of the landed property of the public in Canada has for more than a century been legally entrusted to Land Surveyors who have complied with certain standards, fixed from time to time, the safe-guarding of the property and lives of the public is still liable to fall into the hands of men posing as engineers, but whose qualifications grade from the highest order down to absolute incompetence. If, at any time, the opportunity should arise, I hope every member of our profession will give his individual aid to the Engineers in obtaining statutory requirement for a reasonable standard of fitness.

As to the relations between the Board of Examiners for Land Surveyors in this Province with the other Boards of Examiners for Land Surveyors throughout the Dominion, the situation remains unchanged. Some years ago the Dominion Board decided that the requirements of the Ontario Board were not sufficiently similar to their own to entitle an Ontario Land Surveyor to the limited examination which had previously been accorded by each of those Boards, and notice was sent from Ottawa that the reciprocal relations had been abrogated. There remained nothing for the Ontario Board but to accept the position in which this placed them and developments in the interval seem but to have confirmed this Board in their opinion as to the desirability of our Board requiring of a candidate the full examination included in its curriculum.

From the financial statement which will be placed before you it will be seen that that part of the affairs of the Association is in a satisfactory condition and as the annual contribution of each member is only equivalent to an average half day's earnings no hardship would seem to result from the statutory obligation to pay annual dues, even if the advantage of the interchange of ideas and the information contained in the "Proceedings" and Exchanges be left out of the question.

For the purpose of testing the usefulness or otherwise of the "Act respecting Disputes concerning Boundary Lines," (Chap. 64, R. S. O., 1897), it is suggested that each member employed as a Court Referee should report the fact to the Secretary before the close of each Association year. A number of such references were made during the early part of the existence of this Act, but we are not kept informed as to whether the advantages offered by this very desirable piece of legislation are being made use of or overlooked.

The summary appended to the list of members as published in our latest annual "Proceedings" is as follows:—"Active members subject to dues, 228; active members exempted from dues, 17; withdrawn from practise (including 9 'associates'), 70; dead, 67; total number enrolled since incorporation, 382." We have to report with regret that since our last Annual Meeting, we have lost by death five of our brethren, including James A. Gibson, of Oshawa; Edgar Bray, of Oakville; T. W. Dobbie, of Tillsonburg; W. H. Holland, of Toronto; and Henry Strange, of Rockwood. The last named gentleman had held a commission as a Land Surveyor in Ontario for seventy years.

A feature of this year's meeting is the reunion of the past-Presidents who have held office since the inception of the original Association of Provincial Land Surveyors of Ontario, twenty-three years ago, and while some of those may find it impossible to be present with us it is pleasing to note that only one of the absentees has gone to the great beyond. I refer to the late Major Villiers Sankey, whose active interest in behalf of the Association and profession is well known to each member and the sad death by drowning which overtook him while at the post of duty on 10th July, 1905, is, and will long remain fresh in the memories of those of us who best knew him and his work.

Amongst the items of business which will be brought before you is the report of the Committee on Legislation, whose duties, it will be remembered, were to include the preparation of a draft of suggested alterations in the Survey Act shortly to be revised by the Legislature. While these suggested changes are chiefly in reference to cases of re-surveys not covered by the existing Act and the simplifying of the Act as it has stood for the last decade, it has been more than ever impressed upon this committee that no Act which will provide for the requirements of even nearly all the cases arising from surveys in Ontario will admit of a wording which will render it intelligible to a student not practically familiar with the Crown Surveys made during the last hundred and twenty years. The suggestion made at a former meeting that some enterprising member thoroughly conversant with the Act in all its phases should prepare a digest, to serve as a text book thereon, has apparently not yet been acted upon, and the opportunity still remains open.

Your attention is invited to an interesting and instructive programme covering nearly all parts of the field of occupation of our members and I will not further trespass upon your time.

REPORTS.

SECRETARY-TREASURER'S REPORT.

Mr. Chairman,—I have the honor to lay before you the report of the official business of the Association transacted by me between the 25th February, 1908, and the 23rd February, 1909. The "Papers" that had been read and the minutes of our Annual Meeting were revised and prepared for publication in due time.

We sent copies of our Reports to the following societies:

School Practical Science, Engineering Society ...	150 copies
Michigan Engineering Society	200 copies
Ohio Society, Surveyors and Civil Engineers	200 copies
Illinois Society, Engineers and Surveyors	180 copies
Indiana Engineers' Society	130 copies
Iowa Civil Engineers' & Surveyors' Society	120 copies

And copies of their Reports were sent to all our members who were not in arrears with the Association.

During the year three new members were received into the Association, six active members have had their names placed on the withdrawn list and we have to regret the loss by death of the following :—Messrs. James Alexander Gibson, T. W. Dobbie, James Moore Irwin, William Hugh Holland, Edgar Bray, Henry Strange.

Our Department of Repository and Biography seems to continue in abeyance.

Our thanks are due to the various departments through whom we have regularly received the Annual Reports of the United States Coast and Geodetic Survey, the Geological Survey of Canada, the Dominion Archives, and the Ontario reports of the Bureau of Mines, and the Bureaus of Industry and Forestry.

The financial statement accompanying this report shows the favorable condition of our affairs.

In conclusion I wish to give my warmest thanks to the members of the Association for their forbearance toward me and for the help they have given me in the fulfillment of my duties.

Respectfully submitted,

KILLALY GAMBLE,

Secretary-Treasurer.

STATEMENT OF BALANCES, RECEIPTS AND EXPENDITURES, BETWEEN THE 25TH FEBRUARY, 1908, AND 23RD FEBRUARY, 1909.

Dr.

To Balance in Savings Account, 25th Feb., 1908	$1,993.20
“ Balance in Current Account, 25th Feb., 1908	1,223.25
“ Receipts in Board of Examiners' Account, including Government Grant of $200 and regular fees	744.00
“ Annual Fees, including Associate Fees	705.00
“ Amount collected from Advertisements	57.50
“ Accrued Interest in Savings Account	45.15
	$4,768.10

Cr.

By Amount for Publishing Proceedings 1908-9	$ 397.18
“ Amount granted to Secretary-Treasurer	300.00
“ Amount paid for Postage and Express	112.00
“ Amount Printing and Stationery	82.10
“ Stenographers' Fees, reporting the Annual Meeting	50.00
“ Amount granted to Auditors	10.00
“ Freight, Cartage, Bank exchange, Customs, Brokerage and Sundries	19.76
“ Assurance premium on Secretary's Bond	7.50
“ Caretaker of Repository, etc.	12.00
“ Duplicating examination papers	21.50
	$1,012.04
“ Amount of Disbursements re Board of Examiners' Account	393.80
“ Balance in Savings Account	2,038.35
“ Balance in Current Account	1,323.91
	$4,768.10

KILLALY GAMBLE,
Secretary-Treasurer.

REPORT OF THE COUNCIL OF MANAGEMENT FOR THE YEAR 1908.

The Council begs to report to the Association of Ontario Land Surveyors that it has held two meetings since the last meeting of the Association, one on the 21st of April, 1908, and the other on the 22nd of February, 1909.

At the meeting of the 21st April, 1908, Mr. George B. Kirkpatrick was appointed Chairman of Council for the ensuing year. At this meeting Mr. T. B. Speight was appointed a member of the Board of Examiners instead of Mr. James Robertson, resigned, for the remainder of the term of office of Mr. James Robertson.

The By-law passed at the meeting of February 25th, 1908, exempting from dues Henry John Brown, Toronto, was overlooked as far as the confirmation by the Association of this By-law. A member of Council will move at the present session of the Association that this By-law be approved.

At the meeting of the 21st April, 1908, the several Standing and Special Committees required by the statute, by-laws and resolutions of the Council were appointed, also naming the Chairman of each Committee.

At the meeting of the 22nd February, 1909, the letter from E. Douglas Armour, K.C., re the contract form drawn up by him was read and discussed, also the contract form which was amended in certain particulars and the Council decided to get the opinion of Mr. Armour on these amendments and then to publish the contract form not only in the Minutes of the Association, but also to have a number printed for distribution among the members.

Another matter which had been referred to Mr. Armour was that of the question of persons interfering with a land surveyor while in the discharge of his duty. This, although printed at the end of the statute regarding the survey of lands, is stated by Mr. Armour to be inoperative, and he wrote the Council that he had written to the Minister of Justice at Ottawa, asking him to include this section in the Criminal Code of Canada so as to bring it into operation in the Province of Ontario.

The Council has to regret the loss of four members of the Association by death since the last meeting, namely,—Edgar Bray, Oakville; James Alexander Gibson, Oshawa; W. H. Holland, Toronto, and T. W. Dobbie, Tillsonburg.

Respectfully submitted,

GEO. B. KIRKPATRICK,
Chairman of Council.

REPORT OF BOARD OF EXAMINERS OF ONTARIO LAND SURVEYORS, 1908-9.

The Board met in the Board Room, Department of Lands, Forests and Mines, on Monday, the 8th of February, 1909.

The following candidates passed the required Preliminary Examination :—

William Gourlay Webster,
Francis Porter Adams,
David Alexander Niven,
Robert Murray Gourlay,
James Richard Gill,
Oliver Roland Blandy,
Frederick Carleton Lane.

The following candidates passed the required Final Examination :—

John Wesley Pierce, Kingston, County of Frontenac.
Mason Herman Baker, St. Thomas, County of Elgin.
Charles Ross McColl, Walkerville, County of Essex.
Ernest Wesley Neelands, New Liskeard, District of Nipissing.

The following Surveyors were duly sworn in :—

Albert George Stacey, 30th March, 1908.
Horace L. Seymour, May 1st, 1908.
John Leiper Lang, May 2nd, 1908.
Gordon Foster Summers, Frederick William Paulin, Homer Wilson Sutcliffe, May 11th, 1908.
Clayton Elgin Bush, May 15th, 1908.
Ernest Wesley Neelands, February 16th, 1909.
John Morgan Empey, January 28th, 1909.

Messrs. Pierce, Baker and McColl to present themselves for the purpose of being sworn in at a later date.

The following articles were filed by the undernamed pupils during the year :—

Name of Pupil.	Name of Surveyor.	Residence.	Date of Articles.	Terms.
Jackson, P. A.	G. L. Abrey	Toronto Junct.	Feb. 1, 1908	3 years
Bates, M.	Laird & Routley	Haileybury	April 2, 1908	1 year
McEwen, G. G.	T. H. Dunn	Winchester	April 5, 1908	1 year
Peckover, H. J.	S. B. Code	Smith's Falls	May 1, 1908	1 year
Piquegnat, M.	H. Johnston	Berlin	May 1, 1908	1 year
Canfield, F. O.	W. M. Davis	Berlin	May 1, 1908	1 year
Farley, Sidney E.	A. Bell	Ottawa	May 1, 1908	1 year
LeMay, T. D.	Speight & VanNostrand	Toronto	May 1, 1908	1 year
Hyland, H. M.	C. H. Fullerton	New Liskeard	May 1, 1908	1 year
McColl, C. R.	O. McKay	Walkerville	May 4 1908	1 year
Byrne, T. H.	A. Bell	Ottawa	May 6, 1908	1 year
Eagleson, F. M.	T. H. Dunn	Winchester	May 11, 1908	1 year
Milden, A. J.	[illegible] L. McNaughton	Cornwall	May 11, 1908	1 year
Ross K. G.	J. L. Lang	Toronto	May 15, 1908	1 year
Smith,. F. R.	H. W. Sutcliffe	New Liskeard	Oct. 31, 1908	1 year
Wright, G. C.	F. F. Miller	Napanee	Nov. 1, 1908	1 year
Phillips, E. P. A.	C. H. Fullerton	New Liskeard	Jan. 6, 1909	1 year

The following bonds have been approved and filed with the Provincial Treasurer in accordance with the Revised Statutes of Ontario, 1897, chapter 180, section 36, sub-section 2 :—

A. G. Ardagh,
Albert G. Stacey,
W. James Moore,
H. L. Seymour,
John L. Lang,
Gordon F. Summers,
H. W. Sutcliffe,
J. M. Empey,
E. W. Neelands,
F. W. Paulin,
C. E. Bush.

Under Order in Council of March 27th, 1908, the following were appointed Members of the Board of Examiners for a period of three years :— George Brownly Kirkpatrick, Director of Surveys, of the City of Toronto, and Owen McKay of the City of Windsor, Ontario Land Surveyor.

Respectfully submitted,

GEO. B. KIRKPATRICK,
Chairman of Board.

REPORT OF COMMITTEE ON PUBLICATION.

Mr. President,—Your Committee reviewed the stenographer's minutes of the meeting and prepared the diagrams necessary to illustrate the papers which had been read, at an early date. The publication of the Annual Report was entrusted to the Stevenson Printing Co. and was carried out satisfactorily. 1,350 copies were printed and distributed amongst the societies who exchange Reports with us, and amongst our own members. The By-laws of the Association and the Regulations of the Board of Examiners were printed in the Report. The revenue derived from advertisements is still very meagre.

Respectfully submitted,

KILLALY GAMBLE,
Chairman.

REPORT OF COMMITTEE ON TOPOGRAPHICAL SURVEY.

Gentlemen,—Your Committee on Topographical Survey have been unable to hold a meeting this year, but hope that the paper by Mr. J. Saunders, a member of the Committee, will prove a valuable contribution in this line. Your Chairman communicated with each member of the Committee, but received reply from one only—Mr. J. L. Morris, of Pembroke, from whose communication an extract is given at the end of this report. The Committee on Water Supply in the State of New York, in a recent report to the State Legislature on the development of the water powers of the State included in their estimates the expected development after utilizing all the storage possibilities in connection with the various streams in the State. The Commission recommends the immediate adoption of a progressive water storage policy and an early inauguration of actual construction. It recommends that the State undertake the construction of reservoirs for water storage and protection against floods on the upper Hudson, the Genesee and other streams which frequently cause great loss to property in times of high water. This question has become of great interest and importance in our province. The denudation arising through the absence of forest areas which formerly covered a large portion of the water-sheds, the improved drainage in all parts brought under cultivation have changed the characters of not a few streams which in former years were harmless, but which have become a menace to the property along their banks in many localities through flooding in the spring time or following a period of heavy rain-fall. The water which thus leaves a trail of damages in its wake, might in the majority of cases be gathered into storage reservoirs to be utilized in generating electric energy or of irrigating the dying crops in periods of drouth. The preliminary undertaking of all such work would be a topographical map of the country under consideration showing the comparative levels, the different watersheds and areas belonging to each, and thus gathering data for dealing with this problem in an intelligent manner. At present while one part of the country is seeking assistance for drainage and relieving their land from the surplus of water which lies upon it in the wet seasons, other places are seeking Government aid to protect their property from destruction by this very water which now finds its way into the streams too readily for the safety of those living along the banks below. Indications that the Minister of Public Works contemplates introducing legislation for the purpose of gathering information along this line has been furnished through newspaper reports. As several of the United States have made topographical surveys under their State Legislatures of greater or less accuracy, in addition to the great work which has been carried on by the Coast and Geodetic Survey Staff for so many years, it would not be a difficult task to estimate the cost per square mile of procuring maps sufficiently accurate for the purpose mentioned in this report. Such work as could be carried on by a small staff of skilled topographers who could do their work expeditiously and at the same time attain a degree of accuracy sufficiently close for the construction of sectional maps where the scale would not be greater than one square mile per one inch square. Of course all such work as to cost depends on several conditions, such as the roughness—when the country is hilly many more points are required to be taken to find the relative elevation of different parts, the absence or presence of timber wooded areas of course being very much more costly—the seasons—wet or dry, roads and conditions of transport and facilities with which one could travel around and many other elements which could not be estimated for exactly, but which could be fairly well provided for by men of experience in field work. Had time permitted I might have outlined a plan for carrying on such a work which would perhaps have some points to recommend it, being the work of a practical man of considerable experience rather than a theorist.

"Nothing would be of more value to the commercial and travelling public than a complete topographical map of our Province. The roads and streams of our Province are a closed book to all but the people living in the locality. Not many can give any near proximity of the route which you would follow from Niagara to here, a distance by rail of 400 miles, by direct road 300 miles. Outside of the Montreal and Kingston and Toronto, Hamilton thoroughfare, along Lake Ontario, no other highway is known to the people east or west, as a through roadway. A survey under the control of the Surveys Dept. within the area of the older part of the Province, should be provided for in the estimates of the coming year."

REPORT OF COMMITTEE ON LAND SURVEYING.

Gentlemen,—Your Committee wish to call your attention to the conditions existing in the newer townships, or those which have not yet been fully cleared and settled, and where the original blazed lines and bearing trees and in some instances the original posts still exist. You all know with what rapidity these marks disappear at the approach of settlement, and it appears to us that some more effectual measures should be taken to preserve and permanently mark the original points than those in vogue under the present regulations. The present conditions leave the matter entirely at the option of the interested parties whether or not these points are allowed to disappear or be permanently marked, and the authority given in the Survey Act in the section dealing with the matter is rarely invoked until things have reached such a pass that few, if any, traces can be found of the originals.

Even the surveyor, employed to mark out a lot line and in doing so is compelled to open out the original lines for a considerable distance, necessarily destroys many of the original blazes, and in cutting out bearing trees, has often to cut so deeply as to destroy the tree. The only marks left to replace this destruction as a usual thing is the transient wooden post. A more ruthless destroyer, however, is the lumberman, who cuts whatever will suit his purpose without reference to any other consideration, and the fire that follows at his heels completes the destruction. As it is the members of this Association and those who preceded them who toiled to place these marks in position, and have, or should have, a deep interest in their preservation the devising of some more efficient plan toward that end might with eminent fitness engage your serious attention.

We would again urge upon you the necessity of a more complete committee organization. A little consideration would show the great value to the Association at large and to its members of really serious committee work. Take for instance the "Question Drawer"; granting that the questions sent in are real snags of practise and not mere puzzles drawn from the imagination; their solution by a full committee meeting, with plenty of time for deliberation and full comparison of views, and the publication of such solution, or if two solutions of the same problem appear to have equal merit, the publication of both with their supporting arguments would form a very valuable reference and possess a weight that cannot be assigned to answers under the present conditions. In time these "Questions" could be compiled from the Annual Reports and published separately forming a compendium of practise that would be invaluable and leading to a uniformity of practice that is much to be desired both as a means of avoiding disputes and for the credit of the profession in its relation to the general public. Also in examining a large number of special cases and deducing from them the general principles that control those of nearly similar character the surest means would be taken for formulating amendments or additions to the Survey Act which would be of permanent value. This same argument would apply with equal force to the work entrusted to each individual committee, and much could be undertaken and carried through successfully that cannot under present conditions be attempted. That ever fertile source of dissensions, the Drainage Act, for instance, might by systematic study and comparison of views by a committee whose units were thoroughly imbued and fully seized with the importance of their deliberations, be brought into a really workable shape by the men who know most about it; instead of having the members of this profession endeavoring to blindly follow incomprehensible lawyer-made statutes. As to the means by which this desirable result might be attained, one thing necessary would be to infuse a livelier interest in the proceedings of the Association into the non-attending members. Outside of the duty which every practitioner owes to the profession at large, we think it could be shown that a greater interest would pay viewed in a cold business light.

To afford time for committee meetings two courses might be adopted; add one day to the time of the general meeting to be devoted entirely to committee work; or what might be a more thorough and satisfactory arrangement instead of as at present reading all papers before the meeting, place all papers contributed for publication before the committee having charge of the special subject treated for their approval; have these approved papers published in the Report and discussed or criticized at the following annual meeting. The latter arrangement would give time for committee work and would, we believe, greatly increase the efficiency of the Association. The above is respectfully submitted for your consideration.

J. McC. WATSON,
Chairman.

REPORT OF COMMITTEE ON REPOSITORY AND BIOGRAPHY.

Your Committee beg to report as follows:—

That we have had no additions to our collection of photographs, at present consisting of forty large and twenty-three small ones, and we would again suggest that another album be procured to preserve the ones of cabinet size sent in since the first has been filled.

We mention with pleasure that our suggestion of last year concerning the publication of some of the biographical sketches already collected, has been carried out, and in our last report will be found those of C. G. Hanning, O.L.S., and of Milton C. Schofield, and we would suggest that in the next report the same practice is continued.

Some repairs are still needed to the furniture of the Board Room, also locks to the receptacles for albums and papers. The table is in particular need of attention, being in a sad condition. We would suggest that a draughting table be procured, to be set up except during meetings of the Board, as it is almost sure to be used for that purpose otherwise.

We regret that it has not been found possible to revise the catalogue of books, etc., in the Repository and would suggest that this matter be taken up by the new Committee. When this is done we think it would be advisable to move the books, etc., into the vault, and would suggest that the committee be supplied with a key for this purpose.

Respectfully submitted,
H. L. ESTEN,
Chairman.

REPORT OF EXPLORATION COMMITTEE.

Your Committee beg to report as follows :

Under date of 14th January the chairman wrote each of the members of the Committee on Exploration, asking them to contribute such information as would make an interesting report. Each member of the Committee replied that individually they had no items for such a report, but all are agreed that the time has come when more definite information should be had.

1st. As to the extent of our valuable timber.

2nd. The lands suitable for agriculture.

3rd. Those which should be withheld from settlement entirely.

4th. Those areas of the public domain where the timber has reached its full value and which should be cut under license and under proper regulations.

5th. The location and description of valuable water-powers.

6th. The Dominion Government are about to transfer to this province 146,000 square miles of Keewatin territory, and your committee advise that the immediate exploration of this immense tract of country should be commenced, to ascertain what wealth we have in mines and timber, not only for its values but for its protection.

It is also suggested that track surveys should be made in areas already blocked out to discover those lands which should not be subdivided. More especially those lands at or near the head waters of the sources of water supply for navigable rivers and those furnishing water-powers.

Your committee is of the opinion that serious consideration should be given to this latter subject, as it means so much to the future welfare of our country.

The fact has been noted that Lake Temagami last summer was many feet lower than when in its normal condition, and a difference of several feet in the height of the water in the Niagara River from the normal leads the thoughtful to consider what is the possible cause of this, and if not known such information should be gathered by survey, exploration, or other means, that will guide our legislators as to the best means of retaining this water supply—so essential to the prosperity of the province as an agricultural and manufacturing centre.

Your Committee does not wish to under-estimate the intelligence of this Association, or that of the people of Ontario, by drawing their attention to these facts, but only to emphasize the necessity for prompt action before it is too late.

This subject is one in which every surveyor should take a lively interest, and in every way possible spread the alarm, and familiarize himself with its various bearings on the welfare of our Province. The destruction of our timber will, where the timber has been almost totally destroyed, as seen in those old lands, take away our occupation and make our country a barren waste. Respectfully submitted,

HENRY W. SELBY,
Chairman.

REPORT OF COMMITTEE ON DRAINAGE.

Mr. President,—The Committee on Drainage have very little to report that has not been covered by previous reports as published in the Proceedings. During the past year there has not been as much new work undertaken as in some former years, owing, no doubt, to the very light rainfall during the season.

The question of the maintenance of bridges and culverts over drainage works still continues to give the engineer a good deal of anxiety, and while the wording of the Act seems perfectly clear, procedure has been so different by different engineers and municipalities, and as lawyers have expressed diverse opinions as to the responsibility of the drainage area and the municipality, particularly where more than one municipality is interested, your Committee thinks it would be of vast improvement to the Act if the responsibility for the maintenance of bridges and culverts mentioned in Sub-Section 1 of Sec. 9, was made similar to that of Sub-Sec. 2 of Sec. 9, of this Act.

Litigation continues one of the chief features in drainage, and some decisions of importance have been given, as regards both the Drainage Act and the D. & W. Act.

The matter of drainage upon and across railway lands has been much simplified by the drainage Sections of the Railway Act—Sections 250 and 251, Chapter 37, R. S. C. 1906.

Where a ditch has been laid out under an award, and it is afterwards found that it is damaging a road, the engineer has no power to take part of the water another way if one of the parties objects, the judge holding that the municipality cannot shift its responsibility in this way. Following is the County Judge's decision :

"In my opinion Imeson should have given notice to the several parties under Se tion 35 of the D. & W. Act, requiring them to put their part of the ditch in repair, and in the event of default, the engineer could have been called in. The natural and proper course for the drainage of Imeson's land is by the highway to the River Canard and the engineer in my opinion could have so provided had it not been for the objection of the municipality. The additional amount of water which will be carried along the highway from Imeson's land will not naturally affect it. It is the duty of the municipality to protect its highway but it cannot evade its obligation under the D. & W. Act under the mere suggestion that any additional water will injuriously affect a highway which is already in a dangerous condition. The award will be set aside ; Imeson will pay the engineer's costs of and incidental to the award except the portion deducted to be paid by the municipality, which shall be borne by the municipality. The township will also pay the charges of the engineer, Township Clerk and County Judge on this appeal ; all other costs shall be borne by the respective parties."

Under the Ditches & Watercourses Act, a person cannot drain across his neighbor's land or interfere with his neighbors' ditches if by a reasonable amount of extra work he can get drainage through his own lands. An engineer must file his award within (30) thirty days after the day he sets for his first inspection, or lose his fees.

"In a tier of lots, each of which were about four hundred and fifty feet in width, the lots being numbered from west to east and were drained by a main outlet with a flat grade running from west to east, the owner of one lot, who had a low, level piece of land about five acres across in extent at the north end of his lot, asked to have a ditch laid out under the Ditches and Watercourses Act. At the south end of the level piece of land in this lot, there is a low ridge, and south of this ridge the land was fairly level again for a distance of about nine hundred feet, extending to the drainage outlet. The Township Engineer instead of laying out the ditch through the ridge, ran it east for a distance of about seven or eight hundred feet, through two other lots and then southerly to the drainage outlet. The owners of the lots through which the ditch had been laid out by the Township Engineer appealed to the County Judge to have the award set aside and showed that the owner who applied for the ditch could drain south on his own land through the ridge. The ditch through the ridge would be about four feet in depth for a distance of about three hundred feet, and the Judge decided that the owner who applied for the ditch should make the drain entirely through his own land, instead of going around through his neighbor's lands and taking advantage of the ditches that they had already made. The greatest depth in going around was about two feet eight inches.

This award was set aside on its merits, but it also came out at the end of the trial that the engineer had delayed about a year in making his award, instead of filing it with the Township Clerk in thirty days, and the judge decided that the award would be invalid if not made within the thirty days, and would not allow the engineer his fees."

J. J. NEWMAN,

Chairman.

REPORT OF COMMITTEE ON POLAR RESEARCH.

Mr. President :—On July 6th, 1908, Commander Robt. E. Peary again left New York for the North, on the Steamer "Roosevelt," which had been fully repaired and equipped with new boilers for the expedition, calling at Sydney, N.S., on July 17th. He proposed to winter on the North shore of Grinnell Land, and make another dash for the Pole across the ice during the Spring months. His many friends confidently expect that his "nearest the pole" of 87.6 attained in 1906 with most unfavorable conditions of ice may be passed. We trust that he may return in safety during the year.

The brave Norwegian, Captain Roald Amundson, the first man to navigate the Northwest passage from the Atlantic to the Pacific, proposes to start on a drift across the Pole in Nansen's ship, the "Fram," in 1910. His vessel will be provisioned for four or five years.

Note should also be made of the death of Admiral Sir Francis Leopold McClintock on November 17th last. He was born in 1819, entered the navy in 1831, and served on four Arctic expeditions. He discovered the fate of the Franklin Expedition in 1859. McClintock's "Narrative" remains to-day one of the most interesting and instructive on Polar Research.

Lieutenant Shackleton, who accompanied Capt. Scott in the "Discovery" on his Antarctic Expedition of 1901—1903, left England on Oct. 31st, 1907, in the "Nimrod," a small Newfoundland sealer of 227 tons for the South. On Jan. 1st, 1908, he left New Zealand, and in March the exploring parties landed. In March, 1909, he returned with his vessel, having succeeded on January 9th, 1909, in reaching a point within 111 miles of the South Pole, surpassing all former records either in the Antarctic or the Arctic regions.

For one year at least Great Britain again leads the world.

In Canada another expedition under Capt. Bernier is exploring in our Arctic Islands, and several private parties have been engaged on explorations in the interior of Labrador, and in the Barren Lands West of Hudson Bay.

Wellsman has again announced his intention of attempting to cross the Polar Sea by balloon during this season. It is to be hoped that he may be more successful than the unfortunate Andre.

We would suggest that as opportunity offers, books on Polar Research and Exploration in British America be added to the Library.

Respectfully submitted,

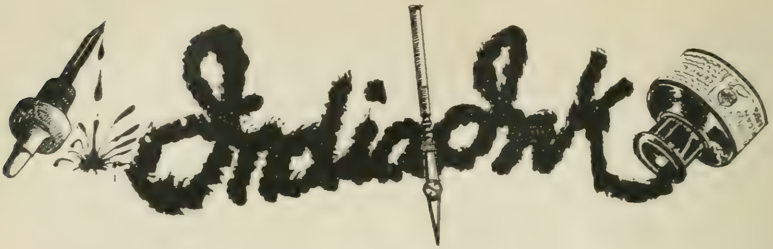
WILLIS CHIPMAN,

Chairman.

REPORT OF COMMITTEE ON ENTERTAINMENT.

Your Committee beg to report as follows:—Our annual dinner was served in McConkey's Restaurant on 24th of February. We had a larger number present than usual and the repast supplied by McConkey was all that could be desired. Our gallant and genial President, Major A. J. Van Nostrand, occupied the chair with dignity added to the graciousness for which he is proverbial, and the vice-chair was ably filled by our Vice-President, Mr. Lewis Bolton. In the unavoidable absence of the Minister of Lands, Forests and Mines, we were pleased to see his deputy, our valued friend, Mr. Aubrey White, with us once more. We were cheered with many enlivening songs and the instrumental music was excellent. Mr. E. C. Easy, C.E., also entertained us with some of his deep, dark thoughts on "India Ink," that subtle intoxicant which abounds in the Surveyor's office, thoughts which led us to occupation with the less darksome fluids around us. We toasted our King and our Country, and parted with the hope of meeting again next year.

Respectfully submitted,
L. V. RORKE.



A RETROSPECTION.

BY C. M. CANNIFF.

(Illustrations by W. Van R. Reynolds).

Mr. E. C. Easy, C.E., inserts as foreword to his monograph this well-known quotation from Pickwick Papers: "Tears never yet wound up a clock, or worked a steam ingen." Then, and thus, he goes on:

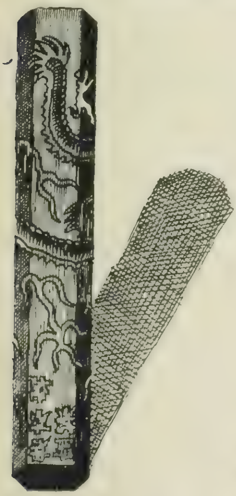
In amiable response—for I'm nothing if not of the anything-for-an-Easy-life sort of chap—in a true, free-grant response to a request of the Secretary of the Association for a paper, "even," as pleaded, "even if it be only about India Ink," I sat down with my "comfiest" pipe and thought long and earnestly. Two subjects readily suggested themselves and were hard to down: "The Reign of the Parallel Ruler," and "The Yonge Street Bridge Disaster, with Special Reference to the 'Long Lost Chord'," but as I realized that the Secretary best knew the Association's requirements—had given me, as it were, an India inkling of the same—I duly conveyed to him a few random reminiscences upon the ink our fathers wore out. Surely, my masters, is it eligible for an elegy.

In a familiar, eat-out-of-your-hand manner, conversational-like, so as to make due clarity of a subject somewhat obscure, I proceeded as follows, and (here I may remark) the identical pen with which same was written will be put up to auction at the close of the Convention.

You will bear in mind the India ink I refer to—the sort, don't you know, in vogue before the genesis of *coli communi*, before we had the autocrat of the autocart, before the hundred-foot tape had swept the chain off its sixty-six feet, ere chainless surveying—in the days historic, when we took a week with a half-hour plan. So I began blithely.

Not having what you might call a fair start, just here I swung off on a three-throw switch or something, and hazarded a remark or two about these plans of yore. Happen with the best of writers, what? One whole day usually went to make a survey for a border that would close, and a couple more for a title.

Nowadays, we make the most commodious border as single-minded and undemonstrative as four knitting needles laid one to the next rectangularly, with never a frothy bow-knot or sign of indecision about the corners; but the old idea was to rhapsodize about and fret them in a whirling eddy of random fuss and fancy. And those prideful, richly dowered titles, bedecked as any strutting peacock, with their reverse curves, and fantastic, festive, festoons; curlicues, cavorting roundabout as lightly as Raphael's pictured children; they were very eye-feasts, dithyrhambs in sinuous black and white. In their French curve elaboration, for pure flambuoyant beauty they ran a close second to a moving picture of a choicely romantic water-fall, or the trail of a champion skater on keen ice doing what is technically called "the grapevine, with variations." The delineator had to draw the line somewhere, of course, but managed to get it pretty promiscuous and bountiful. And if the mantling title did not vaingloriously dominate the plan, the "North Point" did. It was always kicking up high jinks, always posing. In brief, your North Point, instead of being the outspoken, lean and grim thing of to-day, was nothing short of a ballad, your border was a roundelay and your title made a noise like a cross between a grand opera, a warwhoop, and an Aurora Borealis.



But to take to the main line again. The archaic India ink came in long sticks, sort of aristocratic electric light carbons; scale of hardness, 10.99; as to transverse cross-section generally circular, ofttimes square, not infrequently rectangular; or, it might be, glorying in octagonal ornamentality. The vendor handed it over to you smooth, lustrous, embellished with curious cuneiform characters in shiniest gold, or else something horrific in zoological still-life. It was redolent of camphor or vanilla or some other scent of Araby—perhaps elsewhere—also, if you recall, seemed every whit good enough to eat. It yanked one back to the words of

Macaulay when he mentions inhaling—no, not the abhorrently vile cigarette, but—

> "the balmy smells of nard and cassia which the musky
> "wings of the zephyr scatter through the cedared
> "alleys of the Hesperides."

You paid good money for it and took it home and injected a modicum of it into your pen.

But the preliminary manipulation. By the welkin and all its planets! 'Twas fraught with woe exceeding and tribulation. No, you did not go at it with an Indian file—it was a case of circular abrasion by the wet process, for like some mining stocks it was soluble in water. Pampered laborers in the technical vineyard as you are—vain voluptuaries of to-day, satiated sybarites! all you know is how to embathe your pen in some kind of hand-me-down, buy-no-other solution, warranted by the manufacturers of even flow—the which accompanied by its goose-quill stopper, and wrapped in its dainty and gratuitous serviette, its dip cork and clean rag. When you go a-lettering your nerves are steady and your hand as light as the angel shapes that bless an infant's dream. You're a spoilt lot; you've been spared the stick and brought up on the bottle. To me is it given to comprehend why Keats wrote,

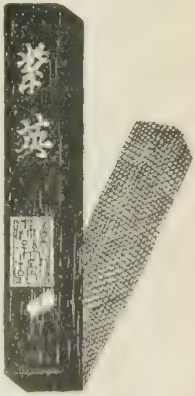
> "O aching time! O moments big as years!"

I understand; he wrote with the wrought ink of the dark ages. If he let his left hand know what his right hand dideth, both got a cramp. One must needs have been endowed with the gracious gifts of bodily vigor, and a sound heart. It was worse than grating a struck bushel of horse radish. But I fail to fathom why they called it India ink; it came from China. I think it must have been the original Chinese puzzle we hear about. Probably the Li Hi's were ashamed of their Chink ink. Come to ponder it over, Alphonso holds no impregnable patent on the æsthetic yet companionable, even diverting, onion labelled "Spanish." These generic terms, like proper names, are often difficult to account for. Not to be egotistical, they call me "Easy," for instance—"which," as a deceased scientific writer of some note has said, "which is absurd."

You call to mind, don't you, you of the older school (as I said before), ere wireless telegraphy—in the days when engineers recked little and cared less about reinforced concrete, and did not give a hoot whether their neutral axis was situate, lying or being in the floor plate above, in the beam beneath, or in the footing under the earth—you call to mind, don't you, the "demnition grind" in those flat saucers? Bethink yourself of the crick you used to get in the neck if you had a tracing to make in a hurry, and arrived at the office late, but found your nigrescent fluidity evaporated to a black currant jelly consistency, and when (stercoraceous oxgall and slimy soap unavailing) it was up to you to sail in, seize that little imp of darkness and slush round for a fresh brew?

It reminded you of the sign that a friend of ours who was away behind in his work put on his door: "Surveys and Plans made while you wait." Funny, wasn't it, how every table you tried was shaky, and you were fated to get your incubator (shall I call it) on a high spot, provocative of a grumbling noise like a loose dumb-bell in a barrel dragging anchor in a down-grade tunnel. Has your memory lapsed concerning that "roughy" spot that you tried—mistakenly—to strike because it seemed like something doing. Just for the nonce, ink was what you wanted, raven-black liquid nigrification of deepest intensity. You learned to do two things at once, grind ink and grind teeth.

You would start off, patiently, pensively, with nice clean water in a scrupulously cleansed side-dish, and rub and rub (round, round and rub), sometimes whistling below your breath like the grooms do when they wield the curry comb—then grunt softly past the dirty clean water, or ten cent sugar period (round, round and rub), through the creole, or fine cut, or mud-pie stage (round, round and rub), past the sad-colored black-strap semaphore (rub and rub and rub), until at length after twenty minutes or so your product looked as Ethiopic as a burnt cork in the inside of a blind cow wallowing in a pile of soot during a heavy thunderstorm.



Pshaw! a trial trip with a drawing pen produced only a dim grey line. No, more yet, keep at it! You were in a bad case. You wondered if stove polish—anything else—would work. You chased that much-to-be-execrated, fossilized ink about that saucer like a black clown in a pigmy circus ring (rub, rub, rub). Away you went till your head swam. Talk about radius of gyration, talk about the mulberry bush (round, round, round rub, rub, rub). You had to hang on like a pup to a root. Watching your fist every moment or two sticking on a dead centre, with blinkers goggled and brain reeling, you considered the chipmunk in his treadmill, going and going and arriving nowhere. "Grinding poverty" (pish, pish—tush, tush)—here was a very wealth of it.

Mind how that perverse cuff, new and iridescent in its pristine starchiness, not reversible, either—mind how it simply *had* to go and get in the smeary utensil and ere long impress some of its Stygian personality upon your drawing paper. The very devil was in that ebon shaft of hard-boiled ink of the middle ages, with its undecipherable cabalistic legend in gilt. It was bewitched, it was fey.

I can even yet see the specks and motes and hairs and other aerial debris that gravitated to the saucer. In good and very sooth did it take to whiskers as naturally and enthusiastically as the Roumanian rag expert in your back lane, who yells with his mouth full, and audibly has no palate. To your utter confusion it seemed as though even came also, from the utmost bounds of the sensible and material earth, "the hair of the tail of the dog of the wild man of Borneo."

Anyway, once you attained a saturated solution, this atmospheric flotsam and jetsam would invade your pen and clog it, and in the first gust of passion make you wish you knew a most notable and clustering bunch of malevolent verbiage. Was anything under the vaulted cope of heaven more exasperating? This old-time blacklead was as the fabled course of true love—it ne'er did run smooth, and probably not of it was written, "dark as midnight was the flow."

Then the oxgall pot would be seized—that epitome, that concentrated essence of odorous abomination—and you would surcharge your refractory dusky dye with an adult's dose of the contaminated run-easy.

You said in your heart, "All Gaul is divided into three parts, each smellier than the rest." The trouble, this time, was each line got more than the lion's share of the blessed paleolithic ink.

One of the saddest things in life then was the realization that my chief, a man grown, with an academic thermometer registering two Old Country degrees (one of them a Dublin one—Dublin, where no dubs come from), that the chief, I say, could imagine how anybody could grind ink till his hand trembled like a cornstalk riding out a gale, and then possibly form letters without antlers growing on them. Your pen, like the heathen, stumbled in inky darkness.

If so be it were a border you were afflicted with, it evolved a strange, unnatural Virginia creeper *mis en scene*. The pen exploded and spluttered like a pinwheel. Two or three snags caught meant that your drawing partook of the scenic characteristics of a certain breed of dog generally to be found between the hind wheels of a fashionable carriage. (I never yet met anyone who knew the name of the breed, but it is a sort of not very cheerful dog, in half mourning—know the kind? Well, it is the only piebald dog I know of that carries his tail like a dipper handle).

Then the rubbing dry to a polish of your wet stick; if no rag were handy, the office towel suffered, or maybe the furring of the lowest portion of your pant leg. This was to prevent your stick cracking, also granulation of its nether latitudes. If cracks came, the only remedy lay in a surgical operation ending in a bandage of glued tracing cloth. If granulation set in, the little hard pellets had to be disintegrated with a knife.

Is it brought back to your memory how when you eventually achieved a choice deep vessel of jet-hued fluidity, you would attempt to prevent evaporation by wetting the rim and carefully pressing the cover tight? Many's the time and oft when you removed the lid you absent-mindedly laid it on your well-stretched drawing, projecting thereby a tolerably accurate embossed circle like unto the ground plan of a standpipe or a silo. When your toil was over, your cuffs were dishclouts, your vest was smeared, collar spotted, nose smudged, and altogether you were a realistic echo of somebody in a bad temper, and about as useful for a time in your chosen profession as a watch with appendicitis.

How a pig-tailed Oriental mixes his ink and keeps clean, search me! Small wonder they run to laundries—and opium. I remember that my idea of the game, I being fecund in resource, was to don a bathing suit and gloves and grind one's mediaeval pigment asquat in a bath-tub. I had one friend who sought the adventitious aid of an old silk tile, and thereupon read a treatise before the Etymological Section of the Literary Society, entitled, "The Derivation of the Term 'Black as Your Hat.'" At that time I was convinced that some such procedure was the proper thing, the specks to be strained out later through a colander. Such, surely, must be the inference of that untranslatable, gilded, laundry language adorning the stick. Pardon me for a temporary surrender to the seething within of the divine afflatus, but—

There was an idiosyncrasy about India ink,
'Twas best to be ground in an odious sink.

But hold, your patience will be exhausted, and every one in the mood of the senior Mr. Weller, who on a certain occasion remarked, "but vether it's worth while goin' through so much to learn so little, as the charity boy said ven he got to the end of the alphabet, is a matter of taste."

However, I want merely to explain how our office in those days got "woke up" and exchanged the tyranny of the old line India ink stick for the solace of the bottle, how it adopted the "Higher Inkism." I know that surveyors like a story with a good plot to it naturally, but 'twas but a brief episode, and withal, no fiction-embellished tale. It happened, of course, in the big draughting room. How well I remember it. As your respected Secretary would say "the following gentlemen were present." First me; I was excessively busy, having got my level book all messed up through want of a little *foresight*; then, there was Mr. Brown, engaged on a colored sketch that no artist could paint; lastly, the chief—but more of these later.

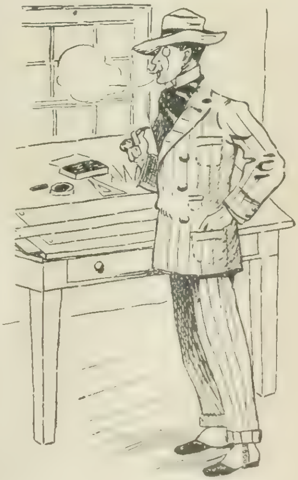
The usual expensive Brussels carpet covered the floor; the familiar mottos and such like adorned the walls. Everything bound in Russia leather, the library made a brave showing with its technical reference books—"The Complete Angler," "The Hundred Best Receipts for Fly Oil," and the rest. Over the door was "God Bless our House when Daddy's in the Bush." The field-note cupboard bore evidence to the broad culture of the chief, for its inscription ran "*Animis Opibusque Parati*"—no unfit maxim for the land surveyors even of this date and place, being of course pure Latinity for "Ready to Stake Life and Property."

The chief was Irish, as I said, married, nine children; used to advise his pupils not to marry if they wanted to be successful; if they did, they became so much matched lumber. He ate Higher Mathematics like a sword swallower. I remember when I first came, and tried to be sociable. It was an off day, and he was calmly discussing his lunch, poring over a chapter of Quaternions, and licking his lips—over which, I know not. I ventured a suggestion that his page of equations looked like blank verse with the colic.

"Young man," responded the chief, gravely, "Quathernions are the poethry av mathematics; for universalithy, that atthribute of your Homer, and Dante and Shakespeare—is the very essintial oil of Quathernions." I succumbed.

In common with others of the old school, upon hearing first of it, the chief was quick to damn hand-me-down ink as the "devil's frippery and seduction." He found it difficult to violently wrench free from tradition.

"That botthled matharial can't bey anny good," he declared; "I av used rubbed ink frish-made daily for forthy-five year. Th'ould things be the bist."



Here the assistant looked up from his labor of emptying half a barrel of riotous blazonry atop of a title—already it was as big and floppy as a "merry widow" worn by a suffragette—and he chipped in and still further desecrated the accustomed environment of grace, mercy and peace. My pet aversion —was this assistant, super-supercilious, so self-sufficient. I used to wonder if there was not something I could put in his coffee secretly and cure him at home. He was tall and had an ingrowing voice cast from Cockney patterns. A pet affection was a blue-flowered waistcoat with whole battalions of large thirty-two candlepower buttons. He wore a glass in his eye, and more rings on his fingers than Saturn — also spats. I've known him cross-section a doleful dump of street cleanings in tan shoes and lavender spats. He revelled in Troy weight machinery about his necktie. Habitually he smoked a bulldog pipe that smelt like the very old Nicotine. His conversation and life were likewise in display type, and to hear him talk you would have thought him possessed of all the winnowed and garnered engineering wisdom of the ages, whereas in truth he had only built a couple of pigeon-hole dams and dabbled in a few other technical trivialities. How could one, I enquire, either favor or respect such an individual—a sort of pseudo-scientific pop-gun, always going off of himself at the slightest provocation. and who put on more airs than a Dovercourt goat with an old pair of corsets. Have you met that kind? Ever try to argue with him? Although he didn't know a hyperbole from a parabola. he simply couldn't confess himself wrong; like the cheese in the package. he would crawl out of it somehow. But enough of this.

Invariably Mr. Brown cast more disparagement upon me and my brand of inkcraft than the chief himself. If. perchance, I was being criticized. he would stand and grin through that ridiculous monocle of his. with an intolerable expression of amused interest. Now. having decided that it was nobler in a man to carry a transit over his shoulder than a shovel, and with the Second Year A. S. germ in my system. can you doubt that. having accidentally come to know and bless the name of Stiggin's Ink. the pendulum of my ambition to grind the heathen article had about reached the limit of its arc?

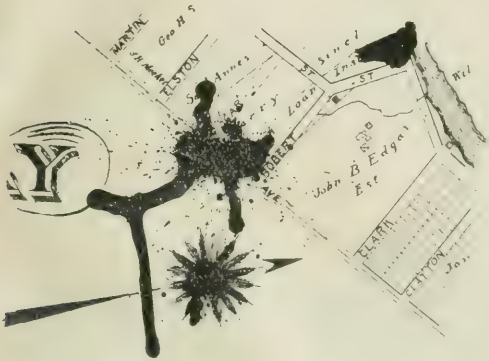
"But you have never used Stiggin's Ink." I expostulated, pursuing an argument that became almost a scene.

"Stiggin's! Oh. I say!" echoed the assistant in his accustomed tone of mockery. his aristocratic nose tip-tilted in scorn. "a vain thing fondly invented. Strikes me. the trouble with you young 'uns at the School is that you think you know it all. My word! you rub up ink like a half-breed cook brews coffee—it's either too bally thick. or too bally thin. or it's chock full o' grounds. Why. blime me. it's grind my own jolly well decent stuff for a plan. Look at this lettering now. I say. black as your boot—that's the way to have ink. ain't it. chief! That's what you call ink." And he purred along. and me crestfallen. and the chief commending. "No. siree." continued Mr. Brown. "none of that stuff for me. At the Registry Office thay siy it jolly well fides out. and then where are their bloomin' records?"

"Yes. that's the kind of thing." after examination. commented the chief: then with some asperity. "Be the powers. Aisy. you railly ought to pay hade to Mr. Brown. I niver like your ink. someway. Watch how he does it next toime. Rimimber the name of ye. Aisy. and 'Aisy does it' ye know. 'Nothing should be done in haste 'cipt catching fleas'—that's an ould proverb."

Mr. Brown gave an upward shear to one side of his circular optic glazing. it shot downwards. and he guffawed hugely. "Right. right-o. chief." said he. when his paroxysm had moderated to the old familiar smile. I gritted my teeth and in silence wished I were in Russia alone with that man. and I the Czar—that is. the Czar with a safety factor of 400 guards of the imperial person. Mr. Brown slowly screwed his double sash in place, and resumed his drawing pen with, "Yes, Easy, you've a brisk lot to learn yet," the while a sardonic, facial expression as though some great sorrow had come to him.

Right there I noticed something peculiar in the assistant's movements—caught his eye momentarily—could I be right? With that transient gleam from the obtrusive monocle did there dart a weeny, little isolated arrow of menace? I had either to fight or get licked lying down.



I finished my task and convoyed my fresh saucer of ink over to the chief, who, by the way, was impatiently waiting to complete a sketch which had to catch the noon mail. Whatever happened, the dish slipped through his fingers and landed skew-"g"* on the floor. The language he employed towards me did not fall exactly as the grateful dew upon the green and tender herb of the field. However, talking of super-heated language, I care not who does the swearing of a country, if I build its dams.

"How in the humping hickory d'ye think Oi'm to finish this now?" he queried, catching his breath. For a brief space the silence was that oppressive one could stick thumbtacks in it.

Even a worm will turn. "Maybe Mr. Brown'll lend you some of his," insinuated I, with never a smile, valorously challenging fame and glory. "There in that top drawer," I nodded to the assistant, "covered over with your newspaper." The eye-glass took a sudden drop, and so did Brown, Esq.

The chief was in a hurry, and there was nothing for it. I *had* Sir Assistant. He was harried and undone. "Eh, what? Confound it! Go, blime me!" Just like that. "It's a bottle of Stiggin's Ink, that new-fangled stuff, don't yer know, that they presented to me to try—Piper's shop downstairs," thus he owned up, elevating it with a ludicrous over-the-fence-is-this-your-cat expression.

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*For value of "g" see any standard text book.

The chief, straightening his back and face, softly enquired, "The kind that makes those bee-u-thiful black, very black lines?"

"Yes, sir, guess I got hold of an extra good bottle. There's a drop—only a drop—left at the bottom," and he handed it to the chief, looking as foolish as a man caught standing on his own foot. Misfortunes never come singly. Slip, plunk, splash—and the precious bottle took a personally conducted tour around our feet.

"Aisy," spoke the chief, twisting to me with a jerk, and with something of the lambent aurora of a smile pervading the purlieus of his mouth, "Aisy," he commanded, "skin down to Piper's shop and buy a pint and a half of Stiggin's Ink. Git annything to irrigate a pen." And he gave a last, long, resigned sigh, not unlike a sand pump in deep thought.

"Yes, sir," was my response, already half out the door, "shall I get the waterproof kind, sir?"

"Shure, to be shure," dreamily responded he, "procure th' amphibious kind. Maybe I'll want to wape whin I use it."

You will be expecting that by now Mr. Assistant was in a state bordering on nervous collapse. Disillusion yourself, please. Just as I was disappearing, he called, accompanied by his faithful eyeglass:

"Yes, and—I say—Easy," came the request, "heah's five and twinty cents to get me a fresh bottle, and look, see that—er!—see that they slit the quill so's a cove can jolly well write with it. Now go—there's a good chappy."

I went. Didn't I just!

Thus it was that in our office the ink of the ancients, with its attendant corporal labor and aqueous circumagitation, had to take to Tamarack Township before the Stiggin's commercial juggernaut. Sounded had been the death-knell for the phrase, "Everyone his own blacksmith." I know, like the surveyor called in about the line fence, that much can be said on both sides, sometimes not quietly either, but I intend having my say to the end. I gave up wearing sticking plaster at my finger tips to keep my nails clean, for from that time the Oriental product that had to be hand-churned was as extinct as the Great Auk, or the Dodo, or the Winged Crocodile, or the Millionaire Engineer, or the Dishonest Contractor.

It was gone, and with it the daily grind. Plans of same may be seen at the office of the Government Engineer. There's a time for everything—beshrew me else—but in this epoch of strenuous Rooseveltism, none for the hand-wrought ink. It is as obsolete as pyramidal duck eggs in a surveyor's office in this year of grace.

Petrified India Ink as an institution was interesting. It is not all uncelebrated and unsung, for a certain minstrel, albeit with broken voice and shivered harp, has it thus—

Conceive him if you can,
A rotary fist young man;
  An India-Inkety,
  Grind-at-the-sinkety,
Black-to-the-ears young man.

[*This Association is not responsible as a body for the opinions expressed in its papers by Authors.*]

HUDSON BAY A NATIONAL ASSET.

BY J. W. TYRRELL, D.L.S., HAMILTON, ONT.

Port Churchill may be regarded as the gateway through which we have every reason to believe in the no very distant future a large share of the products of our western Provinces is destined to pass on its way to the great markets of the world. This statement is not made thoughtlessly or without some knowledge of the subject, for since the years 1885 and 86, when, as hydrographer and meteorological observer on the Gordon expedition to Hudson Bay, I spent a year and a half on its desolate shores, I have made the study of Hudson Bay and the question of its navigation and development a part of my life's work, and it is because of this fact and the consequent acquisition of a considerable amount of first hand knowledge of the subject that I have been prompted to inscribe this paper.

Although discovered nearly three hundred years ago, Hudson Bay has remained up to the present time a comparatively unknown sea, and an entirely undeveloped source of wealth to our country. Although possessing an area five times as large as our Great Lakes combined, and a tidal coast line of about six thousand miles, at no place is this as yet accessible by any form of improved highway, and can still be reached, from the settled parts of Canada, only by means of canoes or other small boats following the routes of some of our God-given streams.

Into the bay are discharged a score of mighty rivers, some of which rank among the largest on the continent, although an unfortunate feature of many of them is that they are extremely shallow at their mouths.

This is not so, however, in the case of the Churchill, the mouth of which, after careful survey, was found to afford an excellent natural harbor with nine fathoms of water at low tide up to the entrance, and from four to five fathoms within.

A map of this harbor, prepared from my own surveys, made on different occasions, appears in my recent issue of Sub-Arctics, and shows the relative positions of the various points of interest, such as the Hudson Bay Company's post, Old Fort Prince of Wales, the Mission Station, Sloop's Cove, where the Furnace and Discovery wintered in 1741; the whaling station on the east side of the harbor, the available anchorage for ships, the best railway terminal site, and lastly, the Police Barracks only recently established by Major Moodie and his men.

HISTORICAL SUMMARY.

Before dealing with the more important questions of resources and navigation of the bay, it may be of interest to briefly review the history of its discovery and exploration. As every Canadian school boy knows, the discovery of the bay was made by Henry Hudson in the year 1610. Being an experienced navigator in foreign seas, he was given command of the "Discovery," a small vessel of 55 tons, and, outfitted by English capitalists, he set sail for the discovery of the long-looked-for northwest passage. In the accomplishment of this object he was unsuccessful, although the greater achievement attended his efforts, for which distinction he forfeited his own life and that of his son, both of whom, with a loyal carpenter, John King, were sent adrift in an open boat by a mutinous crew, the leaders of whom were soon afterwards murdered by Eskimos. Such was the first tragic scene enacted by civilized men in the great theatre of Hudson Bay.

Although the discovery of the bay is attributed to Hudson, that of Hudson Strait was made by Sir Martin Frobisher, who in command of three small vessels, two of 25 tons and one of only 10 tons, sighted the eastern entrance to the strait in July, 1576, and two years later, with a fleet of fifteen ships, in quest of ore, entered Hudson Strait and "sailed several days westward through it."

John Davis in 1585 re-discovered the strait, and in 1602 George Weymouth in the "Discovery" sailed a considerable distance up it.

Following the discovery of the bay by Hudson, Sir Thomas Button re-entered it in 1612, and after spending the summer in exploring the north and western shores, he wintered in the mouth of the Nelson River, and was thus the first to successfully pass a winter in the bay and to return with the fruits of his labors.

In the summer of 1615 Baffin passed through Hudson Strait and into the bay in search of a northwest passage, but finding none he returned the same season to England.

In May, 1619, Captain Jens Munk, in command of a Danish Arctic expedition, sailed from Copenhagen with two small vessels and a total of sixty-four men.

He reached the entrance to Hudson Strait (Fritum Christian, as named by him) on July the 11th, and after experiencing much difficulty and escaping many dangers in his little crafts, chiefly from the meeting with drifting ice, he entered Hudson Bay and apparently crossed it in a comparatively direct course to the mouth of the Churchill River, which harbor he entered early in September, and was thus the first white man, so far as we know, to enter that port.

Munk named this country in the vicinity of Churchill "Novam Daniam," and after securing his vessels as best he could, he sent out exploring parties both to the north and south. Finding no better harbor on the coast than Churchill, he decided to spend the winter there, and accordingly moored his ships, as nearly as can be ascertained from his own description and crude sketch, directly in front of the present H. B. Company's Trading Station. Two or more small buildings appear to have been erected upon the west side of the harbor, and this constituted the earliest known occupation of this most important harbor on the shores of Hudson Bay. The experiences of that early occupation, moreover, form one of the saddest pages in its whole history, for without relating all the terrible details of their sufferings, we are informed by Munk that he himself and two sailors were the only survivors of that awful winter.

The immediate cause of their destruction was due to a lingering disease, which was undoubtedly scurvy, the result of inactivity, uncleanliness and dissipation.

During the year 1631 two expeditions, under the respective commands of Captain Luke Fox and Captain Thomas James, were engaged in exploratory work in Hudson Bay—the latter wintering on Charlton Island, where, because of inexperience and ignorance, much suffering was endured. Both expeditions were of little geographical importance, and returned to England, from whence they had sailed.

So little interest resulted from the efforts of these last two expeditions that for a period of thirty-seven years we have no record of other ships having visited the bay; but history informs us that in 1659 information concerning the great bay was obtained by two French-Canadian fur traders—Radisson and Groseilliers—who were so impressed with the possibilities of trade in that quarter that they returned to Quebec with the object of interesting capital in a project to establish permanent trading posts on its shores.

Meeting with opposition rather than support at Quebec, Groseilliers sought assistance at the English settlement of Boston, and later at Paris, but at all of these places he failed in the accomplishment of his purpose. However, at Paris in 1667 the British Ambassador, Lord Preston, hearing of the proposals of the French-Canadians, sent them with a letter to Prince Rupert in England, who received them well and endorsed their project. Others became interested with him, and the result was that a vessel of fifty tons—the "Nonsuch"—was outfitted, placed under the command of Captain Zachary Gillam, and accompanied by Grosseilliers, was dispatched on the 3rd of June, 1668, as the first trading ship to the shores of Hudson Bay. The "Nonsuch" reached the strait on August 4th and passed through into the bay on the 19th of the same month. Sailing southward down the Eastmain coast, the mouth of the Rupert River was reached on the 29th of September, and here a stockaded log fort was built and named Fort Charles, after the king, and this was the first trading post established in the bay. Here the members of the expedition spent the winter with fruitful results, and upon the return of Gillam to England the following summer, Prince Rupert and his associates applied to Charles II. for an exclusive charter to trade in Hudson Bay and the territory beyond. This was granted on the 2nd of May, 1670, whereupon one Charles Bayly was immediately sent out as the first Governor of the company to establish Fort Rupert, at the mouth of the Rupert River.

Gradually, from year to year, other forts were established at Albany, Moose, Eastmain, Severn, York and Churchill, but not without serious opposition from the French, who opposed every move and made conditions most uncomfortable for the English company until the year 1713, when the struggle was terminated, and by the Treaty of Utrecht the French relinquished all claims to the territory about Hudson Bay.

In 1719, two vessels under the command of Captain James Knight, sailed from England with the object of exploring the northern portion of Hudson Bay and the mythical Anian Strait, but the expedition became wrecked near the east end of Marble Island, upon which a house was erected. In this the survivors of the ill-fated crews existed for several years, until they most miserably perished from starvation and scurvy, the facts not becoming known until the year 1769, when they were obtained by Samuel Hearne, who was that year engaged in whale fishing at the island and accidentally discovered the remnants of the expedition, and from the Eskimos learned the sad details of their fate.

Time will not permit in this brief summary to even outline the discoveries of all the expeditions that have sailed into Hudson Bay, but the names and dates of some of those following are here given:

Dobbs in 1737; Middleton to Churchill and Chesterfield Inlet in 1741; Dobbs to Port Nelson and Chesterfield Inlet in 1746; Christopher to Chesterfield Inlet in 1761; Norton to Chesterfield Inlet in 1762; Samuel Hearne—who accomplished one of the most notable journeys in history—from Fort Churchill to the mouth of the Coppermine River, during the years 1769-70-71-72; Captain Charles Duncan, to Rankin and Chesterfield Inlets in 1791; Sir W. E. Parry, in the Fury and Hecla, to Fox Channel and Fury and Hecla Straits in 1821; Captain Back, to north of bay in the "Terror" in 1836; Dr. John Rae, from Churchill to Repulse Bay, Committe Bay and Gulf of Boothia from 1845-47.

The famous but ill-fated Franklin expedition of 1845 did not enter Hudson Bay, and is therefore not included in our summary, nor are the forty or more relief expeditions which engaged in the search for the lost explorers. It may be of interest, however, to note in passing that it was Dr. John Rae—relatives of whom still live in Hamilton and Dundas—who in 1853-54 obtained the first definite information regarding the fate of Franklin and his men. Four years later Captain F. L. McClintock cleared up the mystery by discovering a record from the lost expedition, and full information as to its awful sufferings and complete destruction, off the shores of King William Island.

Following the explorations of Dr. John Rae, discovery in the Hudson Bay district experienced a long period of stagnation, but with the opening and development of the Canadian West the necessity of improved and extended transportation facilities presented itself, and the Dominion Government undertook to investigate the possibilities of Hudson Bay and Strait as a commercial route to Europe. For the accomplishment of this important undertaking Lieut. A. R. Gordon, R.N., was placed in command of the steamer Neptune in the year 1884 and the steamer Albert in the years 1885 and 1886, and with the assistance of a strong staff of officers, thorough and continuous meteorological, tidal, magnetic and ice observations were taken at seven of the most salient points, both winter and summer, for the space of three years.

During the summer seasons hydrographic and topographical surveying was vigorously prosecuted, and in this department of the work largely was the writer engaged.

During the winter of 1885-86 he also acted as observer at Big Island, near the centre of the north shore of Hudson Strait, probably the most advantageous observation point, both because of its prominent geographical position and its high altitude of four hundred and fifty feet above the sea level. In 1893, in company with my brother, J. B. Tyrrell, then of the Canadian Geological Survey, and again in 1900 it fell to my lot to re-visit the shores of Hudson Bay.

During the summer of 1897 Commander Wakeham, in the steamer "Diana," was again sent to Hudson Strait by the Canadian Government to further investigate conditions there, and during the years 1903 and 1904 A. P. Low, in command of the steamer Neptune, on behalf of the Government of Canada, made a most fruitful voyage into the bay and channels to the north of it, and has since published the most complete and comprehensive report upon that section of the globe that I have yet seen.

During the summer of 1905 it again fell to my lot to re-visit the bay, on which occasion I made a complete survey of the harbor of Fort Churchill—the most important upon the coast.

Besides the names above mentioned, many others have conducted explorations in the bay of greater or less extent, particularly among the mariners of the Hudson's Bay Company. Special credit is due to the extensive work of Dr. Robert Bell, of the Geological Survey, who has contributed largely to our general store of knowledge regarding the Hudson Bay district.

RESOURCES.

Under this heading we have to consider one of the important questions in connection with the opening up and development of the Hudson Bay region. If the local resources are of limited extent and little value, then the difficulties of creating an outlet for commerce from our western wheat fields to Europe by way of Hudson Bay and Strait assume a serious aspect; but if it be true that the local resources are of large extent and great value, surely the success of a well advised railway project to some point on the coast of Hudson Bay is assured.

Classifying the natural resources of the Hudson Bay district under the three great divisions of animal, vegetable and mineral kingdoms, we will begin with the first and briefly review the whole subject, dwelling only upon such items as have come under my personal observation.

1. ANIMAL PRODUCTS.

By far the most valuable animal product is the *Right Bowhead* or *Greenland Whale*, which is found in the northern parts of Hudson Bay and Strait. It is the species from which the whalebone of commerce is derived, as well as a large amount of valuable oil. It is deeply to be regretted that these precious creatures are much less abundant than they were some years ago, but still they are well worth the looking after, as the commercial value of a single specimen ranges from ten to twenty thousand dollars, depending upon size and consequent production of bone and oil.

According to a statement contained in report of A. R. Gordon, 1886, the average value of each whaling cargo from the year 1846 to 1875 was $47,220, and according to report of A. P. Low, 1904, from information supplied by the noted American whaler Captain George Cromer, the average value of a whaling cargo from Hudson Bay between the years 1891 and 1904 was about $35,000—sixty-eight whales having been captured upon nineteen whaling voyages, all of which were American.

White Whales.—Perhaps second in importance and value to the right whale fishery is that of the white whale, a much smaller though a very much more abundant animal. In point of numbers I would judge that the white whale far exceeds all other species of water mammals combined, for in many places and at various times I have seen the surface of the bay appear as a living, plunging mass of white from the great schools of these creatures, nor do they appear to be appreciably diminishing as some other animals are. I observed them in apparently as great numbers about the mouths of the Churchill and Nelson Rivers in 1905 as I had in the same localities twenty years before, although large numbers of them are annually captured at various points by the Hudson's Bay Company, who find in them a profitable source of revenue, the oil and hide products of one animal being worth on the average of about thirty dollars.

The *Narwhal* or *Sea Unicorn* is another valuable species of whale found in the northern parts of the bay and strait, but it is of comparatively rare occurrence. The remarkable feature about this animal is that it possesses a long, straight spiral horn of very fine ivory extending from the upper jaw directly in line with the body. The length of the horn in an adult male is frequently about eight feet, and in value is worth from $2.50 to $3 per pound.

The *Walrus* fishery probably ranks next in value to that of the white whale, for this, the largest species of the seal family, is abundant almost everywhere throughout the northern parts of Hudson Bay and the strait. In 1885 and 1886 I met with great numbers of them along the north shore of Hudson Strait, also in the vicinity of the Digges, the Ottawa and the Sleeper Islands about the sandy shores of which they delight to sport and feed upon the clams and other shell fish which they dig from the sand in shallow waters with their long ivory tusks provided for that purpose. According to A. P. Low, the present southerly limit of the walrus is found at the North Belcher Islands in about Lat. 57, although, as is the case with many other animals, its range was formerly much farther south. Mr. Low also reports that under persistent hunting of late years, the number of these animals is being greatly diminished, and such being the case, it would seem to be most desirable that legal restrictions should be made to prevent the wholesale slaughter and ultimate extermination of these noble creatures, whose existence is almost essential to that of the native tribes of Eskimos.

Since a walrus, like most other seals, sinks immediately when killed in the water, a very large percentage of those killed by existing methods of hunting are completely lost. The harpoon and lance with attached line and float should therefore be the only implements used in the hunt for these animals. From a sportsman's point of view the walrus furnishes one of the grandest fields upon this continent. During my many years of travel through the wilds of northern Canada, I have had occasion to hunt and kill most of the existing varieties of big game, but none that has afforded more real sport and excitement than the walrus. Upon one occasion, when in company with Dr. R. Bell and a boat's crew of eleven men in all, near the shore of the Digges Islands, we were suddenly confronted by a herd of about fifty walruses, all of them snorting and blowing and looking like so many water demons.

Whether out of curiosity or upon mischief bent, I know not, but with heads and shoulders above the water and their long curved ivory tusks gleaming in the sunlight, they charged straight for our position and so terrified some of our Newfoundland sailors that they were with difficulty prevented from jumping overboard into the sea. We were not properly outfitted at the time for walrus hunting, being armed only with five Winchester rifles, but with these we hastily opened a rapid fire and demoralized the band before any of them reached our boat.

Many of them were killed and sank in deep water before they could be secured, but to one we managed to make fast and towed him to the shore—a shelving sandy beach. But when we undertook to haul him out of the water we realized for the first time the enormity of his bulk and weight. Although eleven able-bodied men, we could not without purchase commence to pull the carcass from the water, and even with a parbuckle were only half successful.

Later during the spring of 1896, when stationed at Big Island, Hudson Strait, I fitted up my boat in proper shape with harpoons, lines, floats and lancers for hunting these creatures, and for a short time pursued the avocation of a walrus hunter with success, using my rifle only to dispatch my victims after they had been secured by one or more harpoons with attached floats.

The few hides that I procured at that time were sold in the English market for 6d per pound, and this I believe is about the market price to-day. The weight of a single hide will average about two hundred and fifty pounds, and the ivory tusks, which weigh anywhere from two to ten pounds, are worth about 75c per pound. The oil derived from walrus blubber is of rather inferior quality, and therefore not of great value. The total marketable products of a single adult walrus will, therefore, be worth between $30 and $40.

The *Square-flipper Bearded* or *Big Seal* ranks next in size to the walrus, being commonly about eight feet in length, and is widely distributed, though not very numerous. The hide is largely used by the Eskimos where the best grades of leather are required, and the oil product is also of considerable value.

The *Harp* or *Saddleback Seal* is the species most commonly found in great numbers off the banks of Newfoundland, but it is not frequently met with in Hudson Bay, though quite commonly in the strait. It is valuable for hide and oil products.

The *Ringed* or *Jar Seal,* though the smallest, is the most common and abundant species found in Hudson Bay and adjacent waters. Its flesh, with that of the walrus and the reindeer, forms the chief food of the Eskimos, whilst its pelt for the manufacture of tents and clothing is equally useful. The hide and oil products of this seal would form valuable articles of commerce.

The *Harbor* or *Freshwater Seal* is the fifth and last variety of this animal found in Hudson Bay or adjacent waters, and though not numerous, it is widely distributed. It is highly prized by the Eskimos because of its beautiful, dark, rich, furry coat, that of the young being soft and rich, somewhat like that of the fur seal. Unlike the other varieties, it frequents the fresh water ascending rivers and being found in fresh water lakes of high elevation.

The *Polar Bear* may be regarded in the animal world as the monarch of the Hudson's Bay region. He is found about as frequently in the water as upon the land, having a very wide range over which he roams throughout the year, following the general movements of the seals and other animals upon which he preys. The female polar resorts to the shelter of some friendly snow bank during the winter months, and then gives birth to her young in the month of March, but the males do not hibernate, preferring rather to take their chances of an occasional cold meal whilst roaming their solitary fields of ice and snow. I had occasion one winter to meet with Mr. Bruin when on his foraging rounds, but as I was armed with a good rifle, he furnished the meal, not I. Upon making an examination of the stomach of this bear it was found to contain nothing but the droppings of reindeer. For miles he had followed the tracks of an Eskimo, but met with misfortune before overtaking his quarry.

The skin of the polar bear forms a beautiful and valuable robe, whilst the blubber affords a fine grade of oil, but the chief value of the polar is as a prize for the sportsman.

The *Reindeer* of the Hudson Bay country is to-day what the Buffalo was to the western plains thirty or forty years ago, the chief source of food to the natives; but as they have been described at considerable length in a former chapter of this book, no further mention need be made here.

The *Musk Ox* is one of the noblest and most valuable animals of the northern shores of Hudson Bay and adjacent territory. It is found in very considerable numbers and affords most luxuriant robes.

I have seen musk ox robes stacked by the Eskimos like hay cocks along the shore of Chesterfield Inlet, awaiting an opportunity to market them; but as I have already devoted a chapter to this species I shall not dwell further here.

Woodland Caribou, *Moose* and *Jumping Deer* are found in more or less abundance throughout the timbered country about the southern parts of the bay, so also are *Black Bears*, *Wolves* and *Colored Foxes*. *Black* and *Red* as well as *White Foxes* are also commonly found in the country north of the timber line. I have seen several black foxes and about a thousand white ones trapped by a few Eskimos in Hudson Strait during one winter, and I have also seen and handled a single black fox skin which realized for its owner the sum of sixteen hundred dollars.

Other fur-bearing animals which may be mentioned as products of the Hudson Bay country are *Otter*, *Beaver*, *Fisher*, *Mink*, *Martin, Ermine, Wolverine, Lynx and Wild Cats.*

Fish.—Little definite information seems to be available regarding the varieties and abundance of fish in Hudson Bay and Strait, but certain it is that some of the finest fish I have ever seen or eaten have come from those waters.

From my own personal knowledge I can vouch for the following species:

Salmon of the very finest quality are found in abundance both in Hudson Bay and Strait. I have several times procured them from the Eskimos, and can testify as to their superior quality.

Lake Trout are found in all the streams and lakes tributary to the bay.

Whitefish are caught in the mouths of several of the rivers by the Hudson's Bay Company, and salted in barrels for export.

Cod have been found at a number of points in the northern parts of the bay and strait, and in Ungava Bay of late years a most successful cod fishery has been carried on by Senator Blanchard, a progressive and wealthy Newfoundlander. The Senator informed me that his newly established Ungava Bay fishery had exceeded his best expectations.

Doubtless other varieties of deep water fish will be found when properly fished for, but as yet this has not been done so far as I am aware.

I should have mentioned that *Sturgeon* are plentiful in the Nelson and some other rivers flowing into the bay.

Of feathered game there is a great abundance, particularly of water fowl, the most important of which are:

Brant, Hutchins and Snowy Geese, Northern, American and King Eiders, Squaw Ducks, Swans, Loons, Murres, Guillemots, and many other birds. Ptarmigan are also found in great numbers in many places in the open country. They are commonly caught by the natives with nets and form a staple article of food.

In many places I have seen the geese in such numbers that they could be killed by hundreds with sticks. So much for the game products of Hudson Bay.

2. Vegetable Products.

Under this heading in the northern parts of the Hudson Bay territory we can count upon nothing for export, although in the valley of the Thelon and some other rivers there are valuable belts of Spruce and Tamarack timber for local supply when required. Nearly all of the southern part of the territory south of Latitude 58 is, however, more or less heavily wooded with *White* and *Black Spruce, Tamarack, Poplar, Birch, Pine, Balsam, Cedar, Elm* and *Ash*, given in the order of their abundance.

Very large quantities of milling timber are found in the valleys of all the large rivers emptying into the southern shores of the Hudson and James Bay, whilst the available supply of pulpwood is almost unlimited.

Agricultural development is not to be expected anywhere in the northern parts of the district, but throughout the more southerly wooded portions there are great possibilities in this direction. At Port Churchill I have seen a few hardy garden vegetables grown for local use, but at York, 120 miles farther south, many varieties grow luxuriantly, and I believe that at Moose and other southern points almost all kinds of farm produce have been raised successfully. This being the case, there are millions of acres of agricultural lands between the shores of the bay and the height of land to the south of it.

3. Mineral Products.

Of these little can yet be said excepting as to prospects. Many valuable minerals have been sighted in various parts of the territory, but as yet no systematic prospecting has been undertaken, and with few exceptions, therefore, no reliable information is available as to qualities or quantities of minerals discovered.

Iron Ores are known to occur in several localities, notably along the Eastmain coast and islands near the same; on the west coast of Ungava Bay and the south shore of Hudson Strait, also upon the Mattagami River.

Galena is known to exist in workable quantities at Richmond Gulf and Little Whale River, a few tons of ore having been mined near the Hudson's Bay Company's post at the latter place. Dr. Bell reports assays of two samples of this ore as yielding 5.104 and 12.03 ounces of silver to the ton.

Gold and *Silver* are also reported by Dr. Bell to have been found in small quantities upon the Eastmain coast, near Great Whale River and Dog Island; also on the west coast south of Rankin Inlet, where a large area of the Huronian or Keewatin schists occur. Again, both metals were discovered in small quantities in samples obtained by the doctor from one of the most northerly of the Ottawa Islands.

Molybdenum is reported to have been found upon the Eastmain coast.

Copper has been discovered both on the east and the west coasts, though in unknown quantity.

Lignite is reported to have been discovered on the Missanabie River, *Gypsum* on the Moose, and *Petroleum-bearing Limestone* on the Abitibi.

Good qualities of *building stone* are available on both the east and west shores of the bay. Large quantities of soapstone occur at Mosquito Bay on the east coast, and abundance of *Mica* has been discovered in Chesterfield Inlet, Eastmain and Lake Harbor, a mine being now profitably worked by a Scotch whaler at the latter place, not far from where I spent the winter of 1885-86. Mr. Low reports that in 1904 thirteen tons of excellent mica were taken from this mine.

Graphite has been found on the east shore of Ungava Bay, in White Strait, and near Cape Wolstenholme.

This concludes my brief outline of the resources of the Hudson Bay district; but I think the facts pointed out are sufficient to support in the very strongest manner any well advised scheme to open up the territory either by rail or steamboat transportation, or both.

Navigation of Bay and Straits.

In dealing with this subject I am not unmindful that I am broaching one which has been under serious consideration and investigation for the past twenty-five years, so far without definite results; but as my opportunities for observing actual conditions have been large, I may be able to throw some additional light upon the question which can only be settled by actual test.

Besides having carefully perused the various reports of those who have made a study of the question, I have personally made six voyages across the bay, and have passed four times through the strait and one winter upon Big Island in it.

I assume that the prime motive in opening up a route for commerce through Hudson Bay and Strait is already well understood, viz., to provide the best and much needed additional transportation facilities for the large and ever increasing produce of Western Canada.

As compared with present shipping routes to Europe, the distance from Port Churchill to Liverpool is almost identical with that from Montreal to Liverpool by way of Cape Race, whilst the distance from a central point such as Prince Albert to Churchill is more than twelve hundred miles less than to Montreal. From Regina to Churchill the saving in rail travel would amount to over one thousand miles; and from Edmonton it would amount to more than eleven hundred. Surely the simple statement of these facts alone form the strongest possible argument in favor of railway connection between Port Churchill and the railway systems of the western Provinces, providing, of course, the navigation of Hudson Bay and Strait are feasible. I mention Churchill only as the terminal point, since it is beyond all question the most advantageous port on the west coast of the bay. No unusual difficulties would be met with in the construction of such a road, for during the summer of 1905 it was my privilege to explore a proposed route from Prince Albert to Churchill, and I found it entirely feasible. A year later several other explorers covered the same route in the interest of the Canada Northern Railway, and they have also reported quite favorably upon the project. It remains for us, therefore, to consider only the feasibility of steamboat navigation on the bay and strait.

In this connection we will first investigate the harbor question, and length of season for which it is available. As shown by my map and contours thereon, Churchill harbor is an excellent one, possessing good anchorage in from four to nine fathoms of water at low tide, and the area at this depth may be greatly extended at small cost if more space is required.

From records of the Hudson's Bay Company extending back for a great number of years the average dates of the opening and closing of Churchill Harbor are the 19th of June and the 18th of November, making the length of open season exactly five months. The earliest recorded date of opening was the 5th of June, 1863, and the latest the 2nd of July, 1866. The earliest date of closing was the 1st of November, 1837, and the latest the 4th of December, 1885. These dates of course represent the times of the ice first running out and again setting fast, without any reference to the reappearance of drift ice, from which source some trouble may be experienced during the early summer, but we may quite safely count upon the free and unobstructed use of Churchill Harbor for the four months of July, August, September and October.

I am of opinion that little difficulty would be experienced in keeping the harbor open during the greater part of November, and with the use of icebreakers, it could, if necessary, be kept open throughout the winter.

The strong tidal and river currents in the harbor are natural features which assist very materially in the breaking up and clearing out of the ice. Outside of the harbor a bolt of shore ice forms during the winter season, but beyond this the bay is never frozen, and may be freely navigated at all seasons of the year. Outside of harbors the only difficulties to navigation occur in Hudson Strait, where at three points the channel is contracted to forty or forty-five miles in width. The first of these points, counting from the west, is at the west end of the strait south of Nottingham Island, and here ice jams are frequently met with during the early part of the summer and late in the fall, but by careful observation of the wind and tidal currents these obstructions may often be avoided by passing either to the north of Nottingham or the south of Digges Islands, between which and the main land at Cape Wolstenholme there is deep water. The prevailing direction of the movement of the ice at this locality is from the north, so that it frequently happens that though drift ice may be hard ashore on the north side of Nottingham, there is open water to the south of it. The extreme sluggishness of the magnetic compass is also a source of difficulty to the mariner in this quarter, but the establishment of lights and bell-buoys would largely overcome this, and wireless telegraph stations will contribute largely toward the solution of the whole problem.

The next point where difficulties in navigation are likely to be encountered is about half way through the strait at or south of Big Island. Here there is a strong prevailing set of current to the west along the north shore and to the east along the south shore, and these facts require to be carefully regarded by the navigator, as also the direction of the prevailing winds, which very largely control the position of any drifting ice that may be in those waters.

During the systematic taking of observations on both sides of the strait in 1885 and 1886, it is notable that when ice was observed upon the one side "open water" was the rule upon the other, and vice versa. The most advantageous channel would therefore seem to be fairly central, inclining to the north or south depending upon whether the wind is northerly or southerly.

The third point of contraction is at the eastern entrance to the strait, between Resolution and the Button Islands, and to this locality the above observations regarding currents and wind apply with equal force.

We cannot get away from the fact that a considerable quantity of drifting field ice is likely to be encountered in the strait throughout the month of July, and of course earlier, but by that time it is found to be so broken and softened by the action of the weather and water as to be of little danger to ships, which with average steam power and suitably arranged propellers with attachable blades will be able to force their way through.

As to the occurrence of fog in Hudson Strait, a comparison of carefully kept observations show less than one-third the number of hours recorded in the Straits of Belle Isle.

As to icebergs, they are occasionally met with in Hudson Strait, being sometimes carried in along the north shore by the prevailing current from Davis Strait, but they are by no means of frequent occurrence, and not one-tenth as numerous as off the Straits of Belle Isle.

The strait can, in my opinion, be relied upon for unobstructed navigation from the 15th of July to the 15th of November, with a possible extension of two weeks at either end.

In conclusion I would say that the proposition to open up a route for commerce through Hudson Bay and Strait is, in my opinion, a wise and perfectly feasible move, both because of the service it will render in developing the local resources of the country, and because of the additional transportation facilities it will afford for the products of Western Canada.

[*This Association is not responsible as a body for the opinions expressed in its papers by Authors.*]

THE SURVEYOR, PAST AND PRESENT, AND THE FUTURE PROSPECTS FOR HIM IN NORTHERN ONTARIO.

BY J. F. WHITSON, O.L.S., TORONTO.

In order to form some idea of what there is in the future for Ontario Land Surveyors it is necessary to have some idea of what they have accomplished in the past; the amount of work performed; the remuneration they have received and what still remains to be done in the newer districts now being opened up. In order to do this I will briefly review the surveys performed up to date and will first take the period between the cession by the Treaty of 1763 when surveys were first begun in Upper Canada and the year 1840.

From 1763 to 1792, 1,650,752 acres were surveyed in Upper Canada.

From 1792 to 1840, 14,174,777 acres at a cost of $148,000. From 1827 to 1840, 1,000,000 acres by the Canada Company in Huron Tract at a cost of 2 4-10 cents per acre; 30,280 acres Indian Lands in Glengarry and 330,000 acres on the Grand River by private individuals, making a total area surveyed up to 1840 of 17,185,809 acres. Between 1819 and 1829, inclusive, 3,623,675 acres; over 50 large townships were surveyed and nearly all paid for in lands at 4½ per cent. of the area. The average cost of the surveys from 1802 to 1840 is about 1 penny per acre. The contract system ceased in 1827 as it was found that the work was very carelessly performed.

From 1764 to 1789 the average cost of township surveys was £2 5s. per square mile, or about 1 2-3 cents per acre.

From 1790 to 1800 the cost was £2 10s. to £3 per square mile, or less than 2 cents per acre.

From 1801 to 1822, the average cost was 2 cents per acre. Surveyors were then employed by the year, the remuneration being $1.00 to $1.50 per day when actually employed in the field, which was usually about 5 or 6 months in the year, and 25 cents per day for rations. When not engaged in the field the surveyor was allowed 60c. per day but no allowance for rations.

In 1786, only five Deputy Surveyors were employed by Surveyor-General Samuel Hollands, (Lewis Kotte, P. McNiff, Felix O'Hara, Lieutenant Tinling and Philip Fry). These five men were employed at a total cost per day of £1 15s. when in the field and 16s. when otherwise engaged. Kotte and McNiff each received 7s. 6d. when in the field, or $1.80 per diem. Each party consisted of the surveyor, 2 chainmen, who each received 2s. per day, 6 axemen 1s. 6d. per day, with an allowance of 1s. 3d. per day for rations, the rations to be of the following species : 1½ lbs. of flour, ¾ lb. pork and ½ pint of peas, the allowance 1s. 3d. Provincial Currency per man per day to cover all expenses whatsoever, such as transport, boat hire, camp kettles, axes, tomahawks, tents, bags, snowshoes, etc. The above rates continued till after the close of the war when it was found impossible to procure men at the old rate of wages, and in 1815 after the war, the scale increased to 10s. currency per day for surveyors, 3s. 9d. for chainmen, 2s. 9d. for axemen, with the usual allowance for rations.

On the allowances for wages and rations a surveyor could not in those days be generous, in most cases he went into the woods without even a tent, and when it rained the men peeled bark from the trees and made a rude shelter of it or constructed brush camps or a lean-to, and it often happened that they had to lie down without any covering. There is no allowance of tea or coffee with the rations of flour, pork and peas, and the early records do not give a hint of other beverages, although from the diary of one of the early surveyors while surveying in the swamp lands in Essex County it appears that he began with the purchase of a barrel of flour, a barrel of pork and a barrel of whiskey. This surveyor had evidently read the reports of the surveyors who had preceded him in that section in which they state that the country was nearly all a dense swamp infested in the summer season with venomous flies and poisonous snakes, and to provide against these and the evil effects of drinking swamp water took a generous supply of alcohol.

In 1819 a new scheme was introduced. Township surveys were let by contract and payment made in a percentage of the lands, the common allowance being 4½ per cent. of the area surveyed and if the township was shown to be swampy or broken the land might be selected elsewhere. This continued until 1827. From 1828 to 1836 the cost was regulated by the tariff of rates authorized by O. C. $20.00 per 1000 acres or 2c. per acre. From 1837 to 1850 the system of paying the surveyor and party by the day was resumed, the average cost per lineal mile being about $20.00 to $18.00. Chainmen and explorers were allowed $1.00 per day, assistant chainmen, 75c., axemen 60c., other assistants 50c., and rations 50c.

The O. C. of September 14th, 1863, allowed surveyors to pay to their men the current rate of wages.

In 1855 A. P. Salter was paid $6.00 per day outlining townships on the north shore of Lake Huron, and at $2.00 per day for his assistant, $1.00 per man for his men and $1.00 per day for rations.

In 1861 the contract system was again introduced, 6½c. per acre being the allowance on township work, on other work $4.00 per day to the surveyor, $1.00 to first chainman, 75c. to second chainman, 60c. to axemen, 50c. to other assistants and 50c. per diem for rations. This continued up to 1872 when wages to surveyors were increased to $6.00 per diem, and for townships on the north shore of Lake Superior and Huron 10c. per acre was paid in 1873.

In 1875, the price per acre was fixed at 7c. and remained so until 1903, when it was increased to 9c. per acre over the Height of Land.

The per diem allowance to surveyors for over 20 years prior to 1900 was from $6.00 to $8.00, for base and meridian lines $36.00 to $55.00 per mile. The present price paid by the Government for day work is $10.00 with rations or an allowance of 65c. per day and for base and meridian line work $55.00 to $75.00 per mile depending upon the locality and for subdividing 6 mile townships 10c. to 14c. per acre, and for 9 mile townships 10c. per acre. While the price per acre paid by the Government has increased materially it might here be pointed out, however, that the Department require a much higher class of work of the surveyors to-day than was required over twenty years ago. Very few of the surveyors to-day ever take a compass to the work, all the lines are run with the transit well opened and well blazed. This cannot be said of a great deal of the work performed before 1886 when many of the townships were run almost entirely with the compass.

In the ten years between 1827 and 1836 over 3 million acres of land was subdivided into lots; in 1853 no less than 553,000 acres at a cost of only $13,000 or 2 1-3 cents per acre, one-fourth the amount it would cost to-day.

The Government of Ontario has expended in the last two years more money in surveys than it cost to survey one-half of Old Ontario, prior to 1840. The cost of labor has increased in the last 50 years, including rations, from $1.00 to $2.75 per day, and the actual amount of work performed by a laborer has been decreased by 1-3. Good men could then be procured for $18.00 per month and board. It was no uncommon thing for a surveyor 40 years ago to subdivide 3 large townships in a season with a party not exceeding 10 men. 25 years ago the average length of a working day on a survey in the summer season was over 13 hours and work was seldom discontinued for rain. The most conscientious surveyors. however, remained in camp during a heavy rain if it began before breakfast, but the invariable rule was that if a man once left the camp he should not return as he would get wet returning. and for that reason might as well work all day in the rain or snow. The surveyor would frequently rise an hour earlier if there was any likelihood of it raining before breakfast so as to enable him to get out of sight of the camp before it began to rain heavily. The life of a surveyor to-day has been improved in this respect. Conditions have forced him to change his methods. He has learned that men cannot give good results if not properly sheltered and fed. Few, if any, surveyors would to-day undertake the survey of a new township without tents, and in the winter season without stoves and a comfortable supply of blankets. We have travelled a long way since the surveyor was content to sleep in a brush camp or lean-to or roll himself in a blanket on balsam boughs before a camp fire, and while pork. beans, bread and tea still form the staple supplies, all the articles generally found in the best boarding houses are found on the surveyor's list—butter, cheese, vegetables. pickles, ham and bacon, etc. Twenty years ago the Department of Crown Lands would not allow bacon or hams on the ration list and as for pickles or cheese if such articles appeared it was sufficient to destroy the surveyor's prospects of another Government survey. Joseph Cozens, O. L. S. of the Soo, well known to nearly all of the older members of the profession, was the first surveyor to break through the lines. I believe it was in 1895 or 1896, two bottles of pickles were found on Joseph's list of supplies. As it was a small item, this was allowed to pass although it was forming a precedent, but had there been three bottles the account would, I believe. have been rejected. The next season Joseph went one better as pickles and jam appeared on the same account and this was more than the Auditor would stand and both were struck off. but conditions have gradually changed for the better and in the last fifteen years and to-day all the necessary articles of diet are allowed. It is now considered that an Ontario Land Surveyor and his men are entitled to the same articles of supply as other men on like work and under similar conditions—the best is none too good and more profitable.

Up to the present date little over 46 million acres have been surveyed and subdivided in Ontario out of a total of 140 million acres, scarcely one-third of the Province, and while it may here be said that probably not more than 20 million acres of the unsurveyed portion is suitable for agricultural purposes, yet there is besides the agricultural lands a large area of mineral lands that will in the not distant future require to be surveyed into mining claims and at least two-thirds of the total unsurveyed area will require to be outlined into timber or pulpwood limits in the next 25 years, and if the Province succeeds in acquiring from the Dominion Government, as no doubt it will, the east part of the unsurveyed District of Keewatin, comprising an area estimated at 146,000 square miles, in which not a mile of line has yet been blazed out or a stream traversed, a territory less known than the country bordering on Hudson's Bay, the survey of this additional new territory will in the next 25 years afford profitable employment to many surveyors, and as part of the territory lies in a section supposed to be mineralized, there will be quite a future in this new territory, equal in area almost to the whole of what we now call New Ontario. For surveyors who may have acquired a knowledge of mineralogy and mining engineering, as several of them have among the younger graduates, the rapid development of the mining resources in New Ontario, as well as the development of the immense pulpwood resources, will cause the development of many water powers which are to be found in that District, as well as its agricultural lands. All this development of New Ontario's natural resources will mean much to the younger members of our Association, and to-day I am confident that the future prospects of the surveyor now entering the profession are much brighter than they appeared 20 years ago. The surveyor of the future will, I think, require to be better equipped than was the surveyor of the past if he expects to succeed in New Ontario. He will require to have a better knowledge of geology, mineralogy, timber, forestry and hydraulics, if he expects to share in the work which should properly belong to the Land Surveyor.

Looking back over the reports of some of the older surveyors made within the last 40 years, I find the following stereotype expressions appearing in probably one-half of the reports on township surveys: "No indications of economic minerals were met with, the rocks are chiefly granite, the timber is chiefly pine of small size and of no commercial value," etc., although many of the townships as above described have turned out rich in mineral. Granite has not even been found and the timber on many of these townships described as being of no commercial value has been sold for from $100,000 to half a million dollars. So misleading have been many of the reports of the younger surveyors on the quality, quantity and value of the timber on many of these townships that for many years past, I regret to say that the timber reports are very seldom consulted, except those of the older and experienced surveyors. This state of affairs should not continue. It is an easy matter for one to learn the art of scaling logs or measuring timber or to know what constitutes a defect in a log, but how many of the younger surveyors who making a survey of a new township for the first time can detect whether the timber met with is faulty or not and what its defects are. They can measure the diameter of a tree but cannot scale a log nor tell how much lumber it will cut. They have never looked into a timber scale book and whether a mile will cut a million feet B M or 5 they are unable to form an opinion unless some axeman on the party happens to give them the information. What confidence, therefore, can the Government or a Railway Company, who are greatly interested in tie timber, or a lumber firm place on their reports, and the same remarks will apply to the value of some of the reports with reference to water powers. It is not expected that a surveyor should be a geologist, but every surveyor should have sufficient knowledge of the different rock formations as to be able to classify them in the field. The surveyors today are not reaping the harvest in Northern Ontario they should as there is an impression that a land surveyor is not expected to have a knowledge of timber, minerals, or water powers. Under the present Act he is not required to be examined on these subjects.

[*This Association is not responsible as a body for the opinions expressed in its papers by Authors.*]

LOCAL IMPROVEMENTS.

BY GEO. ROSS, O.L.S., WELLAND.

The Municipal Councils of townships, cities, towns and incorporated villages are authorized by the Consolidated Municipal Act of 1903 to pass by-laws for the purpose of effecting local improvements and works, the whole or a part of the cost of which may be assessed upon the real property especially benefited thereby.

These works or improvements are enumerated in Subsections 1, 2 and 3 of Section 664, and not only include the opening, widening, straightening or extension of streets, making, enlarging or prolonging any common sewer, macadamizing, grading, levelling any street or lane, for constructing sidewalks or footways in, upon and along any public street, lane, alley or place; curbing, sodding, planting, maintaining and caring for trees and plants, upon and in any public street, square or other public place; but provision is also made for the extension of water works, gas works or electric light, heat and power works, when the system is owned by the Municipal Corporation.

Besides the above, there are also provisions laid down for the construction or re-construction of other works, or improvements. However, the works most commonly taken up under the Local Improvement sections of the Municipal Act, in towns and villages, are the construction of sewers and sidewalks, and in this paper I shall confine myself to these.

The provisions according to which by-laws governing the construction of local improvements are to be drawn up are given in considerable detail in the Municipal Act, and it is essential that the procedure laid down in the by-laws be strictly adhered to, especially the formalities required in holding the Court of Revision, and in giving the proper notices to the parties assessed, as all these particulars will be enquired into when the debentures to cover the cost of the work are offered for sale, by the solicitors of the parties who may desire to purchase such debentures, and a little care as to some minor details would save the cost of having said by-laws confirmed by a special Act of Legislation.

The by-laws of many cities and towns relating to local improvements are very similar. The following extracts are taken from the by-laws of the City of Toronto:

"All future expenditure in the city for the several classes of improvements, works and services hereafter mentioned for which special provisions are made in Section 664 of the Consolidated Municipal Act, 1903, that is to say:

1. Making, enlarging or prolonging any common sewer.
2. Opening, widening, prolonging or altering, macadamizing, grading, levelling, paving or planking any street, lane, alley, public way, place, sidewalk, or bridge forming part of a highway.
3. Curbing, sodding or planting any street, land, alley, square, or other public place.
4. Reconstructing as well as constructing any of the said works or improvements,

shall be by special assessment on the property benefited and not exempt by law from assessment."

"In making every such assessment to defray the cost of sewers, pavements and sidewalks, the Engineer, Assessment Commissioner or other officer charged with that duty shall make an allowance of sixty feet upon the flank or side of all corner lots when the depth of a lot equals or exceeds one hundred and twenty feet: but if the depth of such lot is less than one hundred and twenty feet, the allowance shall be one-half of such depth."

"Any allowance made in pursuance of the last preceding section in respect of pavements and sidewalks shall be assumed as a portion of the city's share of the cost of such local improvements, but any such allowance in respect of sewers shall be charged on the other real property assessed for the said sewers."

"The Corporation will provide out of the general funds of the Corporation the cost of such parts of local improvement pavement and sidewalk works as are situate upon or in that part of any street which is intersected by any other street, or as would otherwise fall on property exempt from assessment, and in the case of sewers will also provide out of the general funds the cost of all culverts and other works necessary for street surface drainage, and the cost of those parts of sewers constructed opposite real property exempt from assessment, the part to be provided by the Corporation, to be so provided by debentures."

Applications for Local Improvements and Proceedings Thereon.

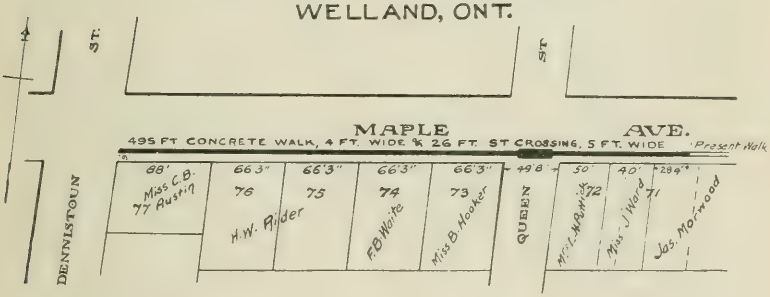
"All works or improvements for any part of the cost of which it is proposed to assess the real property immediately benefited thereby, are herein called 'local improvements,' and shall, unless authorized by special by-law, and except in the case of sidewalks laid down under the authority of Section 677 of the Consolidated Municipal Act, 1903, be initiated in one of the modes hereinafter mentioned."

1. Petition.

"By petition, signed by two-thirds in number of the owners, according to the last revised assessment roll, representing at least one-half in value of the real property to be benefited by the proposed work or improvement."

2. Initiative.

"By the report of the City Engineer, approved of by the Committee on Works and adopted by the Council."



PLAN SHOWING LANDS TO BE ASSESSED
FOR CONCRETE WALK PETITIONED FOR
ON SOUTH SIDE OF MAPLE AVENUE
WELLAND, ONT.

3. Drainage.

"In the case of works undertaken under the authority of Section 668 (4) of the Consolidated Municipal Act, 1903, for the purpose of draining any locality for sanitary purposes by a recommendation of the Local Board of Health, and the City Engineer, affirmed by a vote of two-thirds of all the members of the Council, at any regular meeting thereof."

1. Petition.

"Every petition for a local improvement may have attached thereto a diagram showing each parcel or property to be assessed, together with the frontage of each such parcel, and the street numbers of any buildings thereon."

"Every such petition, after being received by the Council or the City Clerk, shall be forthwith examined by the City Clerk, who shall ascertain and determine whether the same is sufficiently signed as hereinbefore required, and shall endorse thereon his certificate as to whether the same is or is not sufficiently signed as above provided. and shall forthwith transmit the same to the City Engineer.''

''Upon receipt of a sufficiently signed petition for any such work or improvement. the City Engineer shall examine into the subject-matter of the petition and report to the Committee on Works with as little delay as possible as to the necessity for. or advisability of. undertaking the proposed work of improvement. If he reports in favor of undertaking the proposed work or improvement. he shall also report after due and proper examination and inspection:

1. What real property will be immediately benefited by the proposed work or improvement.
2. The probable lifetime of the work or improvement.
3. An estimate of the probable cost of the proposed work or improvement. and the share thereof which should be assessed against the property to be immediately benefited.
4. The proportion in which the assessment thereof should be made on the various portions of the real estate so benefited. and showing by measurement the frontage exempt from taxation therefor.''

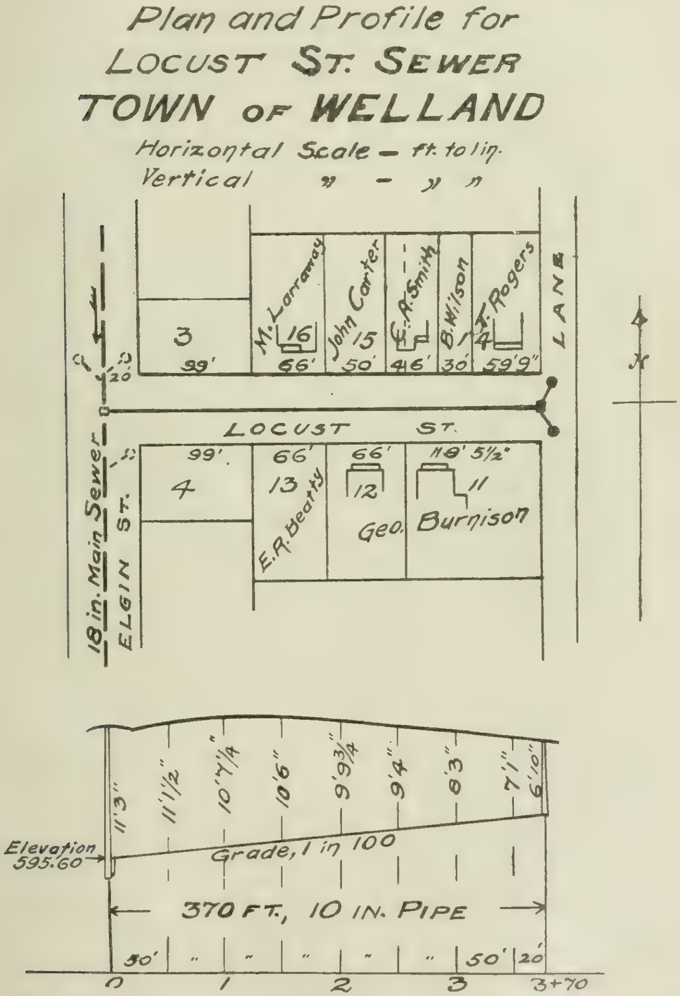
''In the event of the adoption of the report of the said Engineer recommending the undertaking of such work or improvement, the said Committee on Works shall report the same to the Council for its approval and adoption.''

''In the case of the adoption by the Council of the said report, it shall be the duty of the City Engineer to cause the said report (as so adopted) to be forwarded without delay to the Assessment Commissioner. to be brought before the Court of Revision.''

The following are the extracts from the by-laws of another city:

''Whereas it is desirable to provide a uniform frontage tax throughout the city for the construction of sewers. and to provide an equitable mode of assessing corner lots;

''Every owner of property which is drained into any of the main sewers which are constructed wholly at the expense of the city. and every owner of property in front of which a sewer is constructed as a local improvement. shall pay a uniform frontage tax of 79 1/10 cents per foot frontage of the property so drained, to be assessed on each assessable foot of frontage property so drained. Such amount shall be paid in 40 equal annual instalments of four cents each per foot frontage. being a sum sufficient to pay both interest and sinking fund for that amount, and the said instalments shall be payable at the same time as ordinary taxes are payable in the said city, but the City Treasurer may accept payment down of the amount."



The following is an extract from the by-law of another Corporation:

"Therefore the Municipal Council of the Corporation of the town hereby enacts:

"Every owner of property which is drained into any of the main sewers which are constructed wholly at the expense of the town, and every owner of property in front of which a sewer is constructed as a local improvement, shall pay a uniform frontage tax of 70 cents per foot frontage of the property so drained, to be assessed on each assessable foot of frontage property so drained. Such amount shall be paid in 40 equal annual instalments of four cents each per foot frontage, being a sum sufficient to pay both interest and sinking fund for that amount, and the said instalment shall be payable at the same time as ordinary taxes are payable in the said town, but the Town Treasurer may accept payment down of the amount."

"Any property thus assessed for the privileges of connecting with any sewer shall be exempt from any assessment for any sewer construction on the street in front of such property."

"That corner lots shall be assessed for sewers constructed under by-laws for local improvements in the following manner:

(A) Every corner lot shall be entitled to the exemption of one-half the total frontage on the two streets, not exceeding one hundred feet total exemption, except as hereinafter mentioned in Clauses "B" and "C."

(B) In cases where corner lots are built upon on more than one side of the lot, each separate owner or tenement shall pay frontage assessment, as in Clause 8, whether such tenement be on the front or side of the lot, but no such tenement shall pay for more than one street frontage.

(C) If a corner lot is a triangular or irregular shaped piece of land, or otherwise so situated as to make portions of the same unfit for building purposes, such allowance shall be made, having due regard to the situation, value and superficial area of such lot as compared with the adjoining lots or pieces of land, as the Town Engineer may deem just and equitable."

"That the cost of any sewer in excess of the total amount assessed on abutting properties shall be borne by the town."

I consider that a uniform frontage rate for the construction of sewers, mains as well as branches, should be generally adopted, but there does not seem to be any provision made for this in the Municipal Act, and requires a special Act of the Legislature. My own experience has been in cases where the frontage rate has varied according to the cost of the work, running from about forty cents to one dollar and thirty-five cents per foot. When making an assessment for main sewers, an outlet rate was levied on all lots that would ultimately be served by branch sewers leading into said mains, as the mains are not only constructed of larger size, but generally have to be laid at a much greater depth than the branches. The idea I have attempted to carry out is to levy such an assessment for outlet as would finally equalize the assessment on the mains and branches.

Provision is made for an assessment for outlet in Subsection 2 of Section 673 of the Consolidated Municipal Act, which reads as follows:

"Where in order to afford an outlet for the sewerage and drainage of real property other than that fronting or abutting upon the street in which a sewer is proposed to be or is constructed, such sewer is proposed to be or has been constructed of a larger capacity than that required for the efficient sewerage and drainage of the real property fronting or abutting upon the street, the Council may impose a special assessment upon any other real property benefited by the construction of such sewer in the manner provided by Sections 674 and 675 of this Act."

Where the rate of assessment runs at about seventy cents per foot, I have found that the property owners generally prefer to pay the assessment in about ten equal annual instalments. The total amount that would be paid for interest on an assessment of one hundred dollars at the rate of five per cent. per annum would be $29.504. In fifteen annual instalments at the same rate of interest, the total amount of interest would be $44.513. In twenty equal annual instalments the interest at the same rate would be $60.485, and for thirty equal annual instalments at the same rate the total interest would amount to $95.154, and for forty equal annual instalments at the same rate of five per cent. the total interest would amount to $133.113. Where a frontage rate of seventy-nine and one-tenth cents per foot is made payable in forty equal annual instalments of four cents per foot, as mentioned in the by-law referred to above, the rate of interest would be four per cent., and in the case quoted, where the assessment is rated at seventy cents per foot, payable in forty equal annual instalments of four cents per foot, the interest is calculated at the rate of about five per cent., in which case the interest alone will amount to about one-third more than the original assessment.

Section 664a, referring to the cost of the part of the work to be borne by the municipality, is an important section. It reads as follows:

"If the contemplated work or improvement is the construction of a common sewer having a sectional area of more than four feet, one-third of the whole cost thereof shall be provided for by the Council. The Council of every municipality shall also provide, in connection with all sewers and roadways, the cost of all culverts and other works necessary for street surface drainage, and may also in the case of roadways and sidewalks provide the cost of that part of every work, improvement or service which is incurred at and is chargeable in respect of street intersections, and also that part thereof done or made opposite real property which by any general or special Act is exempt from special or local assessment.''

The duties of the municipal engineer are clearly laid down in the Act as well as in the extracts from the by-law already quoted, but I will here append plans and schedule of assessment for a small branch sewer, the lots fronting on which were previously assessed twenty cents per foot as an outlet rate towards the construction of the main sewer.

ASSESSMENT FOR BRANCH SEWER ON LOCUST STREET.

Owners.	Lot and Street.	Frontage.	Assessments.		To cover interest for 10 years at 5 per cent.		Total special rate.		Annual asssessment duringeach yearfor 10 years.	
			$	c.	$	c.	$	c.	$	c.
Geo. Burnison.....	11 S. S. Locust...............	119'5½"	63	56	18	75	82	31	8	23
"	12 "	66'	35	11	10	36	45	47	4	55
E. R. Beatty.......	13 "	66'	35	11	10	26	45	47	4	55
Thos. Rogers	E. pt. 14 N. S. Locust	59'9"	31	79	9	38	41	17	4	12
B. Wilson.	C. pt. 14 "	30'	15	96	4	71	20	67	2	07
C. A. Smith........	W. pt. 14 & E. pt. 15 "	46'	24	47	7	23	31	70	3	17
John Carter	W. pt. 15 "	50'	26	60	7	85	34	45	3	44
M. Larraway.......	16 "	66'	35	11	10	36	45	47	4	55
Total assessment on lots			267	71	79	00	346	71	34	68
Assessment on Municipality.........			94	05	27	74	121	79	12	18
Total			361	76	106	74	468	50	46	86

With regard to the Court of Revision, I may refer to the notices required, although this is no part of the duties of the Engineer.

Notices must be sent to each person assessed, at least fifteen days before the sitting of the Court of Revision, and ten days' notice of the sitting of said court must also be given by an advertisement in at least one newspaper published in the city or town.

Should the actual cost of the work exceed the estimated cost by over ten per cent., it will be necessary to hold another Court of Revision after the completion of the work.

In the construction of sewers where the depth does not exceed about eighteen feet, I find that it is more economical to have the corporation do the work by day labor, in charge of a competent foreman, instead of by contract.

Section 682 of the Consolidated Municipal Act provides for the passing of a by-law with the assent of the electors, directing that all future expenditure in the municipality for the improvements and services, for which special provisions are made in Sections 682 and 686, shall be by special assessment on the property benefited.

Section 679 authorizes a Municipal Council (if they think fit) to provide for constructing, at the expense of the general funds of the municipality, such part of the local improvements as is situate upon or in that part of any public street, lane or square which is intersected by any other public street, lane or square, or as would otherwise fall on property exempt from assessment.

Sections 676, 677 and 678 provide for the construction of sidewalks as local improvements, either with or without a petition on two-thirds or a three-fourths vote of the Council, without the assent of the electors, and to provide for the cost of forty per cent. or any other percentage of the cost of the work in front of the lots, out of the general funds of the municipality, in addition to the cost of street intersections and of the assessment that would otherwise fall on exempt property.

I will give here a plan and schedule, showing assessment for a four-foot concrete sidewalk, seventy per cent. of the cost of which is to be borne by the lot owners, fronting it on the same side of the street, and thirty per cent., in addition to the cost of street intersections is to be borne by the municipality. The street crossing is five feet in width.

The contract price of the walk was thirteen and a half cents per square foot, and fifteen and a half cents per square foot for street crossings.

This work was constructed along with other walks costing about twelve thousand dollars. One and one-half cents per square foot covered the cost of engineering, superintendence, and incidental expenses.

ASSESSMENT FOR CONCRETE SIDEWALK ON THE SOUTH SIDE MAPLE AVENUE.

Owners.	Lot and Street.		Frontage.	Assessment.		To cover interest for 10 years at 5 per cent.		Total special rate.		Annual assessment during each year for 10 years.	
				$	c.	$	c.	$	c.	$	c.
Miss C. B. Austin...	77	S. S. Maple Ave......	88′	36	95	10	91	47	86	4	79
H. W. Rider..........	76 & 75	"	132′ 6″	55	65	16	42	72	07	7	21
F. B. Waite............	74	"	66′3″	27	83	8	21	36	04	3	60
Bertha Hooker.......	73	"	66′3″	27	83	8	21	36	04	3	60
Mrs. L. H. Puttick..	Pt. 72	"	50′	21	00	6	19	27	19	2	72
Miss J. Ward	Pts. 71 & 72	"	40′	16	80	4	95	21	75	2	17
J. Morwood...........	Pt. 71	"	28′4″	11	90	3	51	15	41	1	54
Total assessment on lots				197	96	58	40	256	36	25	63
Assessment on Municipality— 1/3 cost of lot frontage .. $84 84 Street intersections 36 30				121	14	35	73	156	87	15	69
Total				319	10	94	13	413	23	41	32

The schedules given above show the assessment to be levied as ascertained, after the construction of the works, with added interest calculated for a certain number of equal annual instalments.

In the original report containing the assessment based on the estimated cost, the names of the owners of lots to be assessed, the number of their lots, the frontages and the total assessment, are given, but the interest is not added nor the yearly instalments struck.

[*This Association is not responsible as a body for the opinions expressed in its papers by Authors.*]

THE ROAD SURFACE.

BY W. A. M'LEAN, ENGINEER OF HIGHWAYS, TORONTO.

Country highways of Ontario are every year increasing in importance. Without good roads, efforts to improve homes and farms, and commercial and social conditions, throughout the Province, will be largely nullified. As feeders of, and distributors from, the railways, country roads are of great importance to towns and cities. Important as country roads were before the advent of the steam railway, the extension of steam railways has greatly increased their value, for steam railways mean development; and that development, if it means anything, implies the necessity of good country roads.

The road and the vehicle are part of one machine, just as the efficiency of the steam engine is dependent upon steel rails and the roadbed. With the coming of motor vehicles a new era in the use of roads is dawning, and to reap the benefit, country roads must be equal to their new counterpart—the horseless vehicle. Ontario roads are not yet in keeping with the horse-drawn vehicle. While it may seem impracticable to aim at serving a higher class of traffic, it can only be neglected to our own loss.

Problems of road construction involve a considerable degree of skill in dealing with drainage, grades and contours, sub-soils and earthwork, road metal, road location, bridges, road machinery, etc. In addition we have systems of road management and the supervision of labor.

Treating of one department—the road surface—it is impossible to ignore various other features. Mud underneath the road is more destructive than mud on the surface, so that without a well-drained and firm sub-soil, the best road surface must prove a failure. The science of road construction is broad, and to discuss briefly a few details, it is necessary that we assume a suitable foundation, that the road is well located, that drainage is ample, and that the turnpiking is sufficient.

Road metal is placed on a road to make, as far as possible, a waterproof covering for the soil; to make a surface that will resist wear; to distribute the concentrated wheel load over a greater area of sub-soil, and to overcome the surface tendency to mud and dust.

The sub-soil should be crowned, and should be even, without depressions. This is particularly necessary in the case of clay. If there are depressions in a clay surface below the stone, water will find its way into them, will lie there, soften the soil, and weak spots will develop in the road surface through a condition of mud below it.

Before putting stone on an earth roadbed, the sub-soil should be solidified with a roller. This is too commonly evaded in an effort to keep down the cost. It is necessary that the metal form a distinct crust, if its full degree of usefulness is to be obtained. Stone forced down into a soft sub-soil is largely wasted. However firmly a surface layer of road metal may itself be rolled, it will display weakness if the sub-soil has not been consolidated. Earth in its natural state, however solid it may appear, is not as compact as rolling can make it. The cost of roads is not so much in the earthwork as in the cost of treating and hauling surface material. In the amount of metal saved from sinking into a loose sub-soil, and in the greater strength of the road, the cost of rolling the sub-soil is more than repaid.

The road metal, gravel or stone, is intended to form a separate crust over the natural soil, and should be so treated by rolling that it will be a distinct and firmly compacted covering. The benefits of rolling are numerous and difficult to sum up briefly. Rolling is an absolute necessity for the most economical, as well as most durable and satisfactory type of road. Without rolling, a large proportion of the road metal is forced into the sub-soil and wasted before it is bonded into a distinct crust. The road cannot be well formed when it is left for traffic to consolidate. The citizens who are compelled to drive through a mound of loose road metal will never give praise to the man who constructs such a road. By building a finished road on which it is a delight to drive, a little extra cost is quickly forgotten. A more durable road is obtained and the additional expense is further offset by the considerable saving of road metal.

A road surface may be constructed in various ways. The road may be surfaced wholly with crushed stone, using "crusher run"; that is, a mixture of fine and coarse, just as it comes from the crusher, without screening. This makes a surface of uneven quality and strength, and hollows and holes appear quickly under heavy traffic.

Screened stone may be used, placing the coarsest in the bottom and the finer on top. This makes a much smoother surface, of more uniform strength, than does "crusher run." It pays to screen.

Instead of making the road wholly of crushed stone, large flat stones, of sizes up to a foot or eighteen inches square, may be laid on the earth sub-grade, and crushed stone spread over this. This, as a rule, is cheaper than all crushed stone, as a thinner covering of fine (and more expensive) material is required. Where flake stones are used in this way, perfect under-drainage is desirable; otherwise the larger material is heaved by frost, and the finer metal gradually works downward, the large stones coming to the surface. Instead of laying the stone flat, they may be placed on edge, the largest at the centre of the road, the top angles being chipped off and wedged into the voids between the stone. This last method is known as a "Telford" foundation, and is to be recommended for weak sub-soils, or where drainage is difficult.

Instead of a base of large stone, there may be spread a foundation layer of gravel, on which to spread the broken stone. This method is useful where gravel of an inferior quality is plentiful. The gravel makes a stronger foundation than does the natural earth, while the crushed stone makes a more durable wearing surface.

Good results may be had in some cases by using large flake stone for a base and placing gravel on top. This process is useful principally where the earth foundation is very weak, and a gravel of first-class quality can be obtained within reasonable haul.

A common method consists of using pit-gravel in the ordinary manner, without stone. Unless of very exceptional quality, gravel roads are not so lasting as broken stone, particularly for heavy or constant traffic—but it is a question of traffic as well as metal. As a rule, broken stone should be used near large towns. This provides for heavy traffic, with a short wagon-haul if the stone has to be brought in by rail.

A profitable method of using gravel is to pass it through a crusher and screen out the excess of sand and earthy material. Use the screenings as a base, and place the stone on top for a wearing surface. By using a well-equipped plant, and loading wagons from a bin, the saving in cost of loading may be made to pay the cost of crushing and screening, particularly for short hauls from the pit.

In the choice of stone there is room for much variation in the quality of the road. After gravel, the most commonly used material in Ontario is limestone. In this there is much difference in quality, even in the same quarry. Limestone, while softer than most other rocks, gets its value largely by the power of its dust and screenings to cement and re-cement, making an exceptionally waterproof covering, and so bonding as to distribute the concentrated wheel load. The most durable class of road metal is trap rock, but unfortunately there is little available. Granite and gneiss are used with considerable success. Sandstone is very inferior, as it grinds readily into dust, and has little cementing value. Granite and gneiss have not good cementing value, but are harder and more resistant to wear.

The strength and durability of a road is dependent largely upon the binding material used, as developed by thorough sprinkling, and the use of a steam roller. When rolling a road the roller should be preceded by a sprinkler, and the stone kept well saturated. Limestone screenings are most valuable as a binding material, but some limestones have a much stronger cementing value than others. Crystalline limestones are in some cases of little more value in this respect than sandstones. Sand is a very inferior binder. Road metal should be clean, for clay and loam are weak binders. Crushed gravel, bonded with limestone screenings, makes a surface much superior to gravel only.

The width of roads is an important detail in surface treatment. Throughout Ontario all varieties of ideas prevail in this regard. We find the roads graded almost from fence to fence, the full width of the road allowance. In other cases the opposite degree is sought. From study of road conditions in Ontario I am convinced that the width of a road from ditch to ditch should be no greater than traffic demands. The width of road metal should be such that there will not be an earth track at the side. Wide grades are very desirable when kept in good repair, nor are they much more expensive to construct than narrow roads. But they are vastly more difficult and expensive to keep in repair. The choice, except under special conditions, will be between a narrow road that is good and a wide road that is bad. Few municipalities in Ontario, or indeed in any part of the world, will be found so wealthy that they can afford to maintain an unnecessary width of road. When a strip of macadam is flanked by wide, flat clay shoulders, the early destruction of the macadam is certain. Standard European practice is 18 or 20 feet between gutters, and while many roads are wider, others are narrower. This is a point of economy which, for the sake of good roads at least, municipalities in Ontario could well copy. As traffic increases, widen the metal rather than the grade.

The camber or crown of a road gives much play for difference of opinion. A high crown is not desirable so far as traffic is concerned. A new road, however, should first be turnpiked and crowned too high, otherwise it will soon get too flat. A road just right when first constructed will be water-logged at the end of a couple of years. All forces of gravity and traffic are at work to bear down on the camber and grade, the flattening tendency is constant. Under ordinary circumstances in Ontario a crown of one inch to the foot for the stone covering, and two inches to the foot for earth shoulders, is not too great. In the case of town streets, if constant attention is given to repair and the roads are macadamized from curb to curb, this can be reduced; but in the country, narrow roads, sharply crowned, are the roads which return most for the expenditure on them.

The coming of the automobile has drawn attention to the exceedingly dusty condition of roads in summer. The extended use of these machines requires that there be some palliative, both for the property owners along the roads and for the maintenance of the roads themselves. While light motor vehicles travelling at a moderate speed will not seriously injure the roads, the dust removed by heavy touring cars travelling at a high speed removes the binding material, and the stone unravels. A large amount of experiment has been carried on with a view to finding a remedy. Many materials, patented and otherwise, have been brought to public notice. Their careers are usually ephemeral. Tar and tar products are the only materials that have been used with marked success in England, France or the United States. A thoroughly serviceable and cheap system has not been developed. The majority of methods are either too expensive for ordinary use in Ontario, or they are unsuited to our conditions of climate.

This is one of the fields in which there is room for invention in road construction. At the International Road Convention in Paris during October of last year, all departments of road construction received careful and scientific attention. In the conclusions of that convention, however, it has not been shown that any marked advance has in recent years been made in methods of construction. The field is still an open one, and there is much to be hoped for in achieving a type of construction that is at once serviceable, durable and economical.

Discussion.

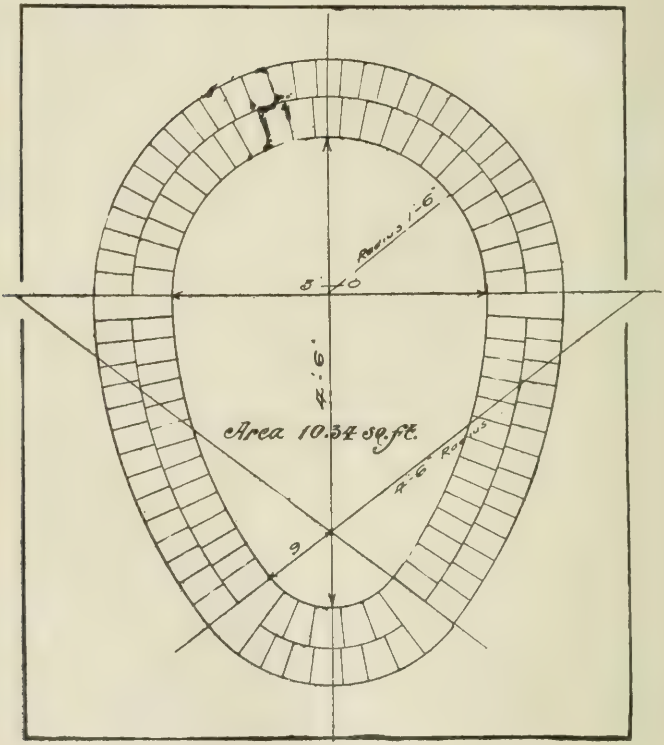
Mr. Gibson—There is one point in reference to road making that is a serious matter. We know that in the country every farmer always drains his fields on to the road. A man who is a path-master drains his land on to the road. I remember on one occasion they were going to appoint me path-master, and I said, I have a lot of land and if I am made path-master I will take care to drain my land on to the road. They said they wouldn't appoint me. I have drawn Mr. Campbell's attention to that. If you want to put up a house or a barn you secure a good foundation, but you cannot get the farmers to understand that if they want to have good roads they must have good drainage. It is the same with roads as with everything else.

[*This Association is not responsible as a body for the opinions expressed in its papers by Authors.*]

SIZES, MATERIALS AND SHAPES OF SEWERS IN THE CITY OF HAMILTON.

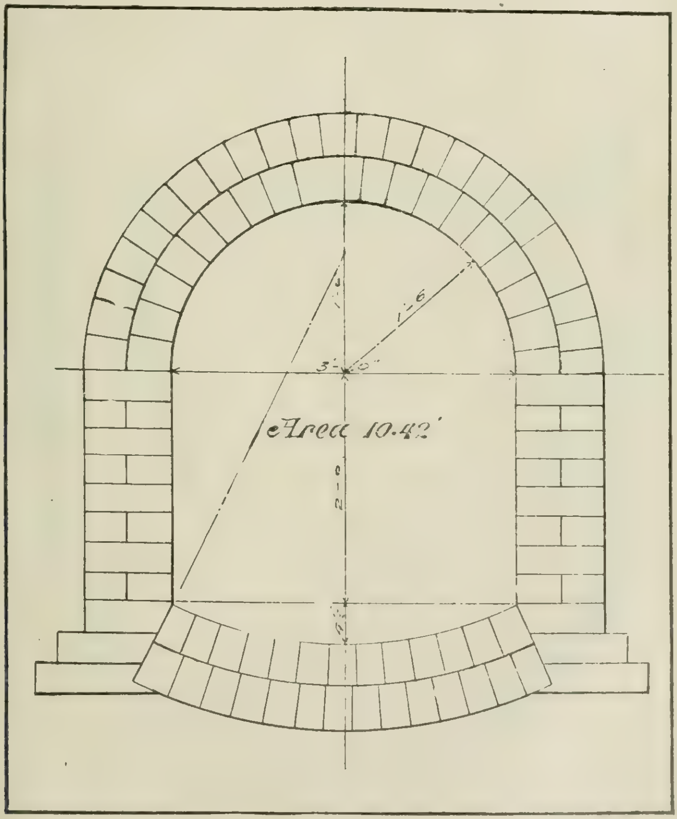
BY E. G. BARROW, HAMILTON, ONT.

It is at times interesting and profitable, especially for the municipal engineer, to take a peep backward into the early history of a city and carefully examine and consider the character of the engineering works constructed at the commencement of its existence, and then follow step by step the various changes in designs and materials which have taken place from time to time in accordance with the advancement made in engineering knowledge.



The object of this paper is not to give an account of the sewerage system of Hamilton, which would take more time than is at present at my disposal, but to describe the various forms and materials of sewers which have been introduced from time to time, pointing out any defects which have been discovered, and stating also the cost of each particular class.

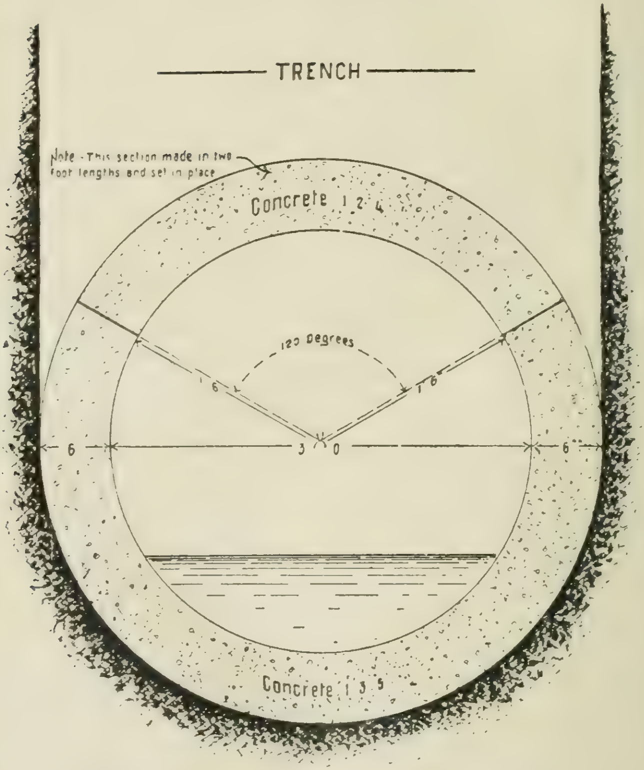
The first sewers built in Hamilton were commenced in the year 1852 and completed in 1857. They consisted of egg-shaped brick sewers, and were about 3½ miles in length. (At the present time there are 83 miles of sewers in Hamilton).



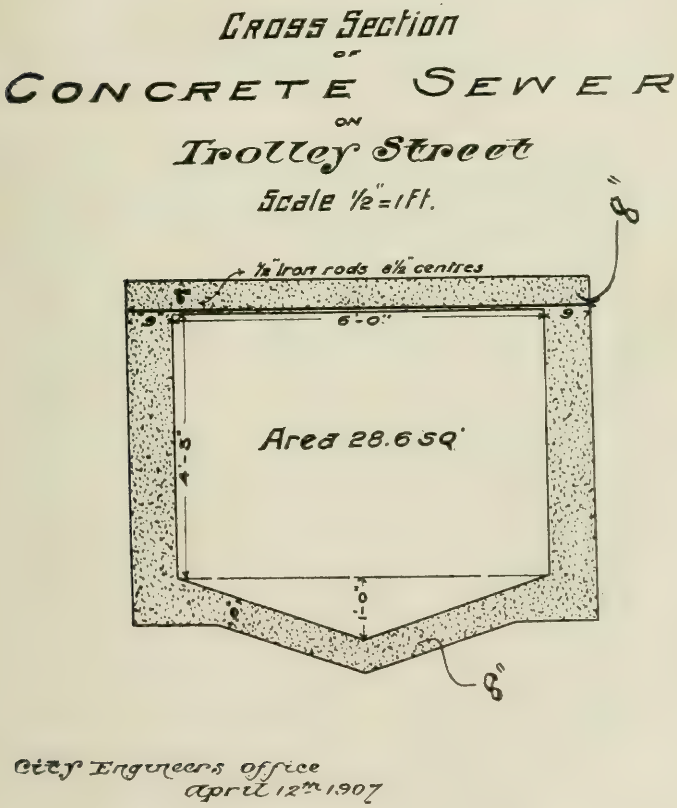
These brick sewers were mostly 4′ 6″ by 3′ 0″, as shown on the accompanying drawing. A small portion at the lower end was 5′ 6″ by 4′ 3″. The sewers on James and Catharine streets were of the same size and area throughout their entire length, and of late years have become gorged at the lower parts and were totally inadequate to take storm waters. There is no record of how the size and area of these sewers was determined. The higher part is unnecessarily large and the lower part too small. They were built of brick with ordinary lime mortar. The top part, or crown of these sewers, as also the sides, are now in a good state of preservation, but the invert has been worn away and has had to be constantly repaired.

Cross-Section-of-Concrete-Sewer

SANFORD-AVE.

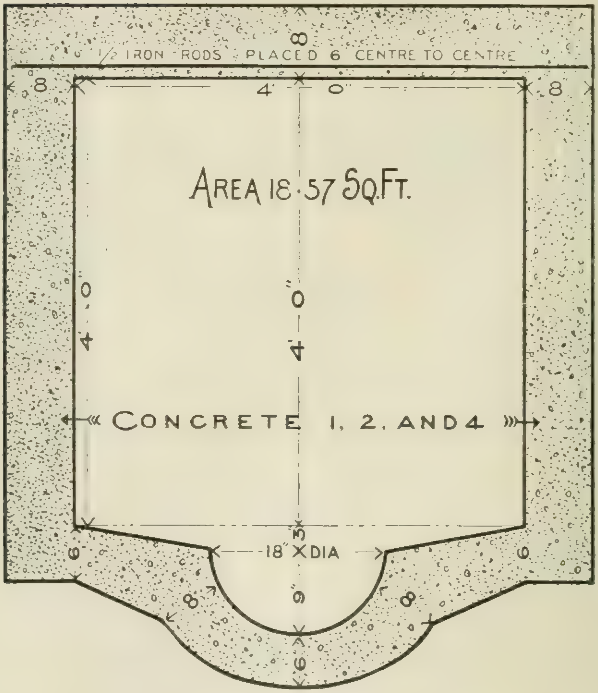

TRENCH
Note - This section made in two foot lengths and set in place
Concrete 1:2:4
120 Degrees
1'6
1'6
6
3'0
6
Concrete 1:3:5

It is probable that the smooth surfaces now presented by cement walks and permanent roadways were not taken into consideration when the sewers were designed, and it is likely also that the higher parts were made large so as to admit of the passage of men through them.



The advantage claimed for the oviform shaped sewer is its adaptability for varying flows; i.e., when there is only a small flow the invert of an egg-shaped sewer gives the necessary scour and keeps the sewers cleaner than a round or a wall-sided sewer. Evidently the wearing at the bottom of this class of sewer calls for a harder material than ordinary sewer brick.

It is really wonderful, however, how well the top and sides of these sewers are preserved, being now 60 years old. It has been necessary to relieve these sewers by overflow sewers, and still, during extraordinary rainfall, they are occasionally gorged. The cost of these sewers was $5.10 per foot, and their average depth 13 feet.



CROSS SECTION
OF
Concrete Sewer on Trolley Str.
FROM
Barton St. to Beach Road
SCALE 1 IN. = 1 FT.

City Engineer's office
October 14th 1907

E. S. Barrow
City Engineer

The next form of sewer was what is called the wall-sided, and was introduced into the system by Mr. Haskins, City Engineer. The first sewer of this class was built in 1889 and formed the trunk sewer for the west end district. The egg shape form was discarded because the ordinary flow was fairly uniform and copious, and the inequality of flow for which an egg-shaped sewer is particularly suitable was not present in this case, and by the adoption of the new form a cheaper sewer could be built and the wear of the invert on the egg-shape sewer avoided. This sewer cost $5.01 per foot, and was about 12 ft. 6 in. deep. It is in a good state of preservation, and the invert is not worn to any appreciable extent. Water lime was the cementing material used.

Vitrified pipe sewers were first laid in 1877, and the joints were made with clay. It was found that the roots of trees, especially the poplar, got into the seer through these joints and clogged them. There was also a large leakage of sewage at these parts. The above defects led to the introduction of cement joints in the year 1895.

No vitrified pipe sewer larger than 24 inches has been laid in this city, and many engineers consider 15 inches as the largest size they would recommend.

The first concrete sewer was built in 1905 on Sanford avenue, and was circular in form and 3 ft. in diameter. It was composed of one part of cement, 3 parts sand, and 5 parts gravel. The lower two-thirds of the sewer was built in moulds placed in the trench, and the remaining part was constructed above ground in two-foot lengths.

The cost of this sewer was as follows:

	Cost per ft.
Labor moulding top 1-3 of sewer	$0.29
Labor moulding 2-3 sewer in place	0.98
Materials—	
Cement, 1.31 bags	0.655
Cost of centres and moulds	0.149
Gravel, 0.215 cubic yards	0.339
Tools and reps. of same, tow, nails, oil, etc	0.141
Lumber	0.195
	$2.759
Excavation 13 ft. deep	2.765
Total cost per foot	$5.524

This sewer, built in 1905, is the oldest we have of this material, and sufficient time has not elapsed to pronounce with certainty as to its superiority over brick.

The next concrete sewer was built in 1906 and was 3′ 6″ in diameter, circular in form, and constructed similarly to that last described on Sanford avenue. A comparative cost of cement and brick sewers of same capacity is here given:

CEMENT SEWER ON CATHARINE STREET, WOOD STREET TO THE BAY, BUILT IN 1906.

3 ft. 6 in. diameter, 10 ft. 6 in. deep, and 1,465 ft. in length.

	Cost per ft.	Total Cost.	
Excavation, labor 20c per hour......	$1 63	$2,389 61	
Cement Work, Moulds..............	1 19	1,745 60	2 06
Cement, 2,091 bags at 50c...........	71	1,045 50	
Gravel and Sand....................	16	233 75	
Lumber	09	137 48	
Repairing tools, rubber boots, nails, oil, etc.	06	82 13	
Advertising and inspection..........	11	164 30	
Engineering Department, Levels, Stationery	05	77 57	
Manhole	04	41 01	
1,465 ft.	$4 04	$5,917 04	

Note.—Cement concrete sewer, 3 feet 6 inches diameter, without excavation. Cost, $2.06 per foot.

BRICK SEWER ON CATHARINE STREET, FROM WOOD STREET TO BARTON STREET, BUILT IN 1903.

18 ft. deep and 2,933 ft. in length.

		Cost per ft.	Total Cost.
Labor, excavating and filling, 18c per hour		$3.908	$11,462 55
Labor, brick work, 35c per hour.....	2.205	0.738	2,165 81
Brick, $6.90 per M.................		0.895	2,625 93
Cement, 50c per bag...............		0.468	1,374 55
Sand and gravel...................		0.104	306 15
Lumber		0.094	276 24
Dynamite.........................		0.02	60 80
Tools, repairs		0.122	357 61
Iron pipe		0.13	383 82
Manhole castings		0.01	39 82
2,933 ft....................		$6.489	$19,053 28

Brick sewer at current rates, same size, without excavation, would cost $2.757 per foot.

COST OF ABOVE SEWER AT CURRENT RATES FOR WAGES AND MATERIAL.

	Cost per ft.	
Labor, excavating and filling at 20c per hour......	$4.30	
Labor, brick work at 45c per hour.............	0.95	2.757
Brick at $9.50 per M..........................	1.235	
Cement at 50c per bag.........................	0.468	
Sand and gravel	0.104	
	$7.057	

In 1907 a large reinforced concrete sewer was built composing the trunk sewer of an extensive district at the east end of the city.

For a large portion of its length this sewer had very little cover, and the following forms were designed to meet the existing conditions. The excavation was in very hard blue clay and could be excavated accurately to the shape of the sewer. The large section cost $10 a foot and the smaller one $7.85.

The relative merits of concrete and brick as a material for sewers is now being debated somewhat hotly. Our cement concrete sewers have not been down long enough to judge of their durability.

The experience in Hamilton would be that no cast iron rule can be laid down with regard to the shape of a sewer, but a study of the surrounding circumstances and conditions will dictate the best form to be adopted.

DISCUSSION.

Mr. P. S. Gibson—Do you find they can put in concrete sewers cheaper than brick?

Mr. Barrow—Yes. I suppose it is on account of the labor being cheaper. Bricklayers' wages are higher than concrete laborers, but I thought it might be interesting and I gave the items and everything so that you could judge of it.

Mr. Gibson—We will have these experts reading your report.

Mr. Barrow—I see that some parties from Toronto have gone away to find out which is the best kind, concrete or brick.

The President—Has concrete been used for a sufficient length of time anywhere to give a fair idea of its durability for that purpose?

Mr. Barrow—Yes. I think it has in some parts of the Old Country: in Paris especially. I think it has given general satisfaction unless there are some peculiar acids or chemicals in the soil or water that attacks the lining.

The President—The acids in the sewage itself I have heard affect it. Did you find that to be the case?

Mr. Barrow—We did. We know the brick has stood very well, except in the bottom of the inverts. I think that is owing to the form; it narrows the scour into a small compass, and the sand, etc., getting in wears it.

Mr. Gibson—I have heard some question raised as to cement sewers, that they are apt to absorb so much of the sewage as eventually to start a leakage. Did you find that in Hamilton?

Mr. Barrow—No. It seems there is a species of glutinous matter that grows over the "round" of the sewers and renders them almost waterproof.

Mr. Gibson—Do you get the concrete sufficiently hard to keep the sewage from being absorbed by the concrete?

Mr. Barrow—Yes.

Mr. Gibson—How do you do that?

Mr. Barrow—We ram it very well. In fact, I think that is a very important thing to do.

Mr. Gibson—What is the proportion between cement and other material you put in the sewers?

Mr. Barrow—I think it is 1, 3 and 5.

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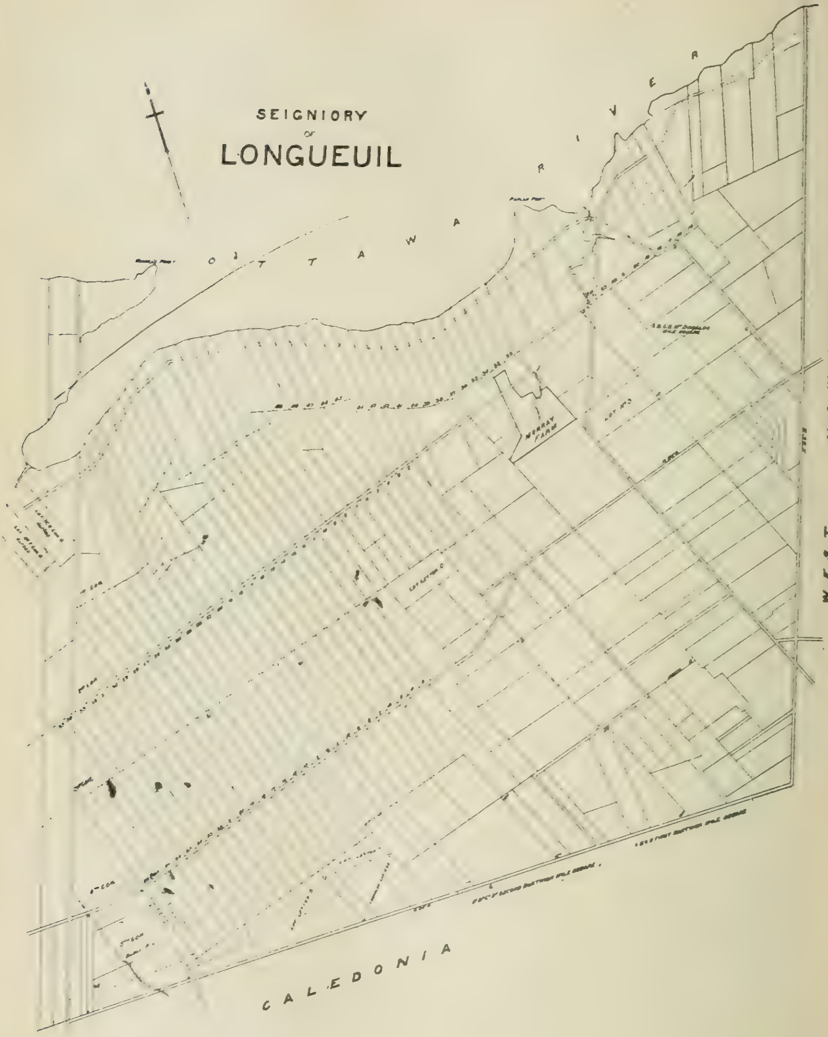
THE SEIGNIORY OF LONGUEUIL.

BY E. T. WILKIE, O.L.S., CARLETON PLACE, ONT.

This is the only Seigniory in the Province of Ontario, and is situated on the bank of the Ottawa River, with the Township of Hawksbury on the east side of it, the Township of Alfred on the west side, and the Township of Caledonia on the south side. It is now generally known as the Township of Longueuil, being a regularly organized township under the municipal law of the Province.

The Seigniory was a part of the grant from the French Government to "La Compagnie des Indes Occidentales," of France, the description being two leagues in front by two leagues in depth. On the 27th November, 1874, the company sold it to Mr. Prevost, the Town Mayor of Quebec. Prevost sold it to the Soulanges family, and by inheritance the Baron de Longueuil got it and the present name has followed from him. N. H. Treadwell, father of the late Sheriff Treadwell, purchased it from Baron de Longueuil, the consideration being one thousand guineas, Halifax currency, equal to about 17s 8¾d each. Sheriff Treadwell left it to his son, Charles Platt Treadwell, who sold it out in pieces about as indicated by the plan. There never was a survey made, although in the westerly part there seems to have been an attempt at a sort of concession and lot division. The plan was compiled by the late Robert Hamilton, and was the private property of the late Registrar, Mr. John Higginson, from whom I got permission to take a copy. In the Registry Office matters are in a bad shape, the only way of following the title of a lot being by the names of the owners, no numbers being used on the lots. The Registrar would not guarantee title. Portions of it were known by such names as Murray Farm, Chandler Lot, Hartwick First Mile Square, Hartwick Second Mile Square, Block R, etc. The village of L'Orignal is situated in the north-east corner of the township, and takes in a considerable quantity of farm land.


SEIGNIORY
OF
LONGUEUIL
OTTAWA RIVER
MURRAY FARM
WEST HAWKESBURY
CALEDONIA

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EQUIPMENT AND MANAGEMENT OF A PARTY ON A "TOWNSHIP OUTLINE" SURVEY.

BY T. B. SPEIGHT, D.L.S., TORONTO, ONT.

The instructions for a survey issued by the Department of Lands, Forests and Mines usually assume that the surveyor to whom they are addressed is in full possession of all information necessary for journeying to his work and carrying it to successful completion. It has always been found in practice that this information includes innumerable details, larger or smaller, the neglect of which may have a very important bearing on the net result of the contract. Every year's experience adds to one's stock-in-trade in the matter of details, and yet leaves much to be learned.

The purpose of this paper is to set down some of the more important items for the use of the beginner and to promote discussion which will be of benefit to us all.

The first step of importance is to obtain all the reliable information relative to the different routes leading to the various parts of the field of operations, so that the supplies may be replenished as the work progresses. The sources of this class of data include the merchants or trading agents operating in or near the district. In the event of one having no acquaintance with any of these dealers, it is usually not difficult to find some surveyor who has, and in nearly every instance it will be found desirable to get in touch with the local dealers at the outset.

In arranging for supplies, while the wholesale dealers in the large centers give lower prices, it must be remembered that the good will of the local merchants is desirable, as we are to be dependent upon them for many good offices during the season. Our practice in recent years is to place the meat order at Toronto and arrange early with the local dealers for nearly all other forms of provisions.

It is sometimes found advantageous to have supplies transported in a part of the way by contract, but this is a somewhat expensive method, and the goods when landed are seldom in as good condition as if handled under the watchful eye of the owner.

During the past few years we have paid from $12 to $18 per cwt. for a distance of 150 miles in from the railway, but if it had been possible to take all the supplies in with our own party, the cost would have been considerably less.

Every surveyor after a few years' experience in this class of survey has more or less fixed ideas as to the items and quantities required for a given number of men for a given time, and of course no two surveyors agree in all details. Further, it has been found that no two parties of men can be relied upon to require equal quantities of any given article of diet during a season.

Keeping the above in view, the following list is submitted as having served a party averaging 25 in number for a recent survey occupying 100 days: Flour, 3,400 lbs., or 1 1-3 lbs. per day per man; long clear bacon and ham, 1,500 lbs., corned beef (Cambridge or Oxford Brand), 200 lbs., sausage, 200 lbs., or 1 lb. of meat per day per man; lard, 150 lbs.; beans, 650 lbs., or ¼ lb. per day per man; cheese, 100 lbs.; potatoes (evaporated), 180 lbs., or 1-10 lb. per day per man; vegetables (evaporated), 25 lbs.; raisins, 100 lbs.; tea, mixed, 75 per cent. black and 25 per cent. green, 100 lbs.; coffee, 20 lbs.; condensed milk and cream, 6 cases of 48 tins each; baking powder, 60 lbs.; syrup, 200 lbs.; sugar, 950 lbs., 2-5 lb. per day per man; butter, 180 lbs., 1-10 lb. per day per man; soap (common), 60 lbs.; soap (toilet), 15 lbs.; rolled oats, 75 lbs.; wheatlets, 100 lbs.; pickles, 35 lbs.; yeast cakes, 5 lbs.; rice, 150 lbs., 1-17 lb. per day per man; split peas, 60 lbs.; pearl barley, 50 lbs.; salt, 50 lbs.; mustard, pepper, resin for canoes, white lead for canoes, smoking tobacco, chewing tobacco, candles, matches, medicine chest. Hardware—Two Dutch reflectors; two nests of good tin pails (5 in each), largest size 12 in. diameter; cups, knives, forks, spoons (large and small), 1 granite stewing kettle, axes, one for every member of the party; axe handles, two sizes; three granite bake kettles (nest), largest size, 14 in. dia. x 9 in. high; fishing tackle; shoe packs for party, at least twenty pair of the more common sizes.

For the housing of the party and outfit, nine light "drill" tents about 7 feet by 9 feet (some larger, some smaller) were used, each being provided with a "tarpaulin" of similar material to serve as floor. Each tent was supplied with mosquito netting for the door and rear ventilator. For summer use I prefer small light tents accommodating from two to four men each. Four or five large extra tarpaulins are necessary for purposes to be referred to later.

Five canoes 18 feet to 19 feet, by about 48 inches beam, and capable of carrying 1,500 pounds each, exclusive of a crew of 4 to 5 men, were used for the journey in, and a sixth canoe, canvas, double-ribbed, 17 feet by 36 inches beam, was "packed" along the line during the whole survey for use in crossing rivers and lakes.

The selection of the party is a most important factor. Where possible, it is advisable to have for a large party a dozen tried bushmen, packers, canoemen and axemen of known worth, who with the necessary incentives will set a good pace for the remainder. The "boss packer" is one of this group, and he should have special gifts and qualifications, chief amongst which are intelligence, tact, executive ability, loyalty to his employer, and the attributes that pertain to a leader of men. When you get such a man, don't be afraid to pay him 75 per cent. to 100 per cent. more than the current rate of wages. He should be sought out early and given the privilege of naming at least two or three men upon whom he can rely to back him up in time of difficulty, as his work is one of great responsibility and will sometimes, if not well done, cause serious delays. From four to six axemen from your own vicinity or county should be taken. In this generation the average young farmer or farm hand is not a skilled axeman, but if he is the right sort of man, he develops rapidly, and a few "stand-bys" from Old Ontario are sometimes of much value in the event of possible insubordination showing itself. From the numerous applicants for "staff" positions the chainmen can be selected, and one of them should be capable of acting as transitman should the occasion arise. At least two of the chainmen should know enough of trigonometry to be able to check triangulations. Picketmen—not less than poets—are "born," and besides having good judgment and an eye for line and country, he should also be a good leader of men. If a good one is discovered in one season, it is well to keep in touch with him for future possible work, and remunerate him according to his services.

Last, but by no means least, is the cook, the all-important man of the party. If he is competent, energetic, thrifty and loyal, he is worth $75 a month, but if he fails in any of those points, he will probably be dear at any price.

The journey in from the railway serves as a "trying out" process. On the evening before the start is made the crews for the several canoes should be told off, and the "boss packer's" advice is often sought with good results. There should be at least two able and experienced canoemen for each craft, the remainder being sorted out from such material as we have. For work in rapids, the bowman must have a quick and trained eye. The steersman takes his cue from him by the eye rather than the ear.

Each canoe and its contents is placed entirely in charge of the man in the stern, and he is held responsible for the safe delivery of the original cargo, subject to such modifications as have been found necessary during the trip. A tarpaulin of sufficient size to cover the whole canoe must at all times be kept within easy reach in case of sudden showers. By the end of the first day's trip the experienced surveyor will be able to make whatever readjustment of crews and cargoes may be necessary to balance the whole fleet. The cook and his essentials should be located in the largest canoe owing to the bulky nature of a part of his outfit. He is not expected to devote as much energy to paddling, as his hours of labor are long. He should also be given a good deal of assistance when ashore, but there is usually little difficulty in securing this.

The day's work, whether when travelling or at work on the line, is broken into three parts, punctuated as follows: Breakfast at six a.m.; first lunch—corresponding to the ordinary mid-day meal—between ten and eleven a.m.; second lunch—somewhat lighter than the first—between two and three p.m., and the evening meal at six p.m. This method gives about nine hours of actual labor per day, and does not produce the exhaustion which more protracted periods of labor do. The average party, if given the choice, would select this method, and the net results to the employer are, in my opinion, very much in his favor.

Portages are usually numerous and some are long, frequently deep also in spots. Where possible they are utilized for meal hours and camps. Satan—even in the wilderness—finds mischief for idle hands, and if the men can be kept employed in "packing" a couple of tons of impedimenta while the cook is pursuing his duties, his majesty's plans may sometimes be frustrated. Judicious management in the forwarding of the whole outfit over a portage counts for much in the progress of the journey. As a rule, if men have been fairly dealt by, few shirks will be found, and any who attempt to dodge a fair share of the work will find little sympathy from their comrades. By the time about thirty portages have been made, the last one in a recent season being nearly ten miles in length, each man has had an opportunity of judging whether the wild, free life of the woods is all his fancy painted it—in advance.

The journey being completed and the beginning of the "work" reached, all the larger canoes are to be sent back, or if a sufficient number of men cannot be spared, the less valuable canoes are discarded. It sometimes happens that one or more of the novices decide, about this juncture, that they will assist the canoemen in retracing the route "light," and "excess baggage," if I may borrow a term, is disposed of in this way.

The canoemen return to the railway and bring in the requisite amount of supplies to replenish the working party's provisions at the most convenient canoe route connecting with the work as it progresses. This process is repeated throughout the season, the men occupied in it being termed "supply men" and numbering from two to six, depending upon the distances and the nature of the routes to be travelled. It is most important that the head supply man be well fitted in every way for the duty, and he and his comrades are usually selected by the surveyor from the way in which they have done their work on the journey in from the railway to the starting point of the survey.

In like manner the surveyor has formed his conclusions as to the distribution of his forces in the several departments on the line, viz., packers, axemen, chainmen, and picketmen, it being always made clear to each man when he is engaged that his work will consist of whatever the surveyor sees fit to depute him to do.

The duties of the packers—from five to seven in number, depending upon circumstances—are to keep the camp and supplies forwarded along the line so as to best suit the progress of the work, the canoe in particular being always kept well up and ready for use should it be needed. The packers are not to advance nearer than one station from the end of the line, and are to be particularly careful in passing all station pickets, which for the purpose of distinguishing them have always a cross and piece of white paper attached, the line at each station point being left wide enough to enable the packers to pass. A packing stage is usually the length of a "sight."

In the daily moving of camp the cook is left undisturbed until about the time of the first lunch, and his outfit is the first to arrive at the site for the next camp. The "lightweights" amongst the packers are then left with the cook to prepare camp while the remainder of the goods are being brought forward. There is a rule of exchange between the surveyor and the "boss packer," each being watchful to send any help he can spare to the packers or axemen, as the case may be, when extra help is needed. The chainmen also are often required to give a lift with packing if necessary.

The axemen are usually five or six in number, with occasionally a seventh borrowed from the packers, the least expert man being held responsible for the blazing throughout. A part of the blazing may be expected of the chainmen, but the blazer is required to see that the whole line is properly blazed. In leaving camp in the morning all the linemen, whether axemen, picketmen, chainmen or surveyor, are required to pack their own personal effects, including the tents occupied by them, as far as the end of the line, usually one-half to three-quarters of a mile ahead. The packers are thus relieved of a part of the labor of the daily camp moving. The most expert axeman—whether serving as an axeman or picketman—makes the posts, and these are marked and placed in position by the chainmen, who also blaze, mark and note the bearing trees.

An extra instrument is always kept ready for use, not only to provide against accidents to the one in constant use, but it is most convenient to be able to leave the "line" transit always at the end of the line and use the spare instrument for the observations at camp. This effects a considerable saving in time and labor.

Amongst the duties falling to the chainmen are the carrying and preparing of the lunches. For carrying lunches, two pack sacks, or two bags tied "turkey" fashion, are used. One contains the tea pail, in which the cups, meat and butter are placed in separate tins. The other sack contains the other eatables. Every man in the whole party is provided with and made responsible for an axe and "tump line."

For the insects that make life a burden during the summer months, "fly dopes" innumerable have been recommended, but after having given a fair trial to a considerable number of these, I have been satisfied with none and have settled down to making the tent secure at night by means of mosquito netting. If good rest at night be assured the trials of the day may be borne.

As mentioned at the outset, this paper is not expected to cover every detail, nor, in fact, could any paper be relied upon for that, but the information contained may be of service to those who have yet to gain their experience in work in Northern Ontario.

Discussion.

Mr. Fawcett—I would like to say a word or two with reference to this paper. There is no one in the country capable of dealing better with this subject than Mr. Speight; Mr. Speight and Mr. Niven are the base line men of this Province. Mr. Speight's list of supplies is much the same as the list I would make out; my rule has been to take everything that the men can possibly want to eat, and I find that the expense of keeping a party of men is about the same, no matter what provisions you get; some will eat a lot of meat and some will eat a lot of sugar; some will eat porridge and some will not, and I always like to have a supply of everything, so that the men may suit themselves.

I think that this paper will be very valuable, for you will often find with reference to equipment that men who have not had very much experience will take a lot of things that they do not require; it is a wise thing to take nothing along that you can get along without. I have very much pleasure in supporting this motion that this paper be published in the minutes.

Mr. Beatty—With reference to the remarks of Mr. Fawcett, I think I would hardly go as far as to say that I would take along everything the men want; at the same time I think that it is advisable to take a good variety. The cheapest party I ever took out, the least cost per man, was one in which the cook gave the men every variety that they could possibly get; it was much cheaper than if they had the usual thing of bacon, beans and flour. I don't know whether the cakes and pies were as good for the men. At the same time it was much cheaper in actual cost.

I would like to hear from Mr. Fitzgerald; he has had a good deal of experience of this nature.

Mr. Fitzgerald—I think Mr. Beatty has paid me a compliment that I am hardly worthy of. I have never had any experience with outline work except during the past season. I think Mr. Speight's paper is a very good one; at the same time, I doubt if there is much use in telling a man what he ought to do; he will have his own ideas and he will carry them out.

There is one point I would like to mention; I see Mr. Speight gets along with about 35 pounds of salt; I found that the bacon is liable to get rusty, and I generally carry from 150 to 200 pounds salt.

Mr. Speight—Regarding that last observation, I have no recollection of ever having any bacon spoiled by getting wet.

Mr. Fitzgerald—You must have had good packers to keep it dry.

Mr. Speight—The last three years we have had it put in waterproof bags, and we never have any trouble about it spoiling; sometimes we smoke it a little.

Mr. Selby—We have to carry our supplies sometimes for 100 days in the Peace River country, but I found if we got the imported bacon it would not spoil even if it did get wet; we have to get our supplies in February and they are to last us till November or December, so we have to take good care of them; we have to have caches built, and have the bacon hung up so that there will be plenty of air blowing through it. Imported bacon will not need salting; it is only the home bacon that will give trouble. I think that this paper is most valuable, and I concur in the motion.

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GRAVITY.

BY OTTO KLOTZ, LL.D., F.R.A.S., OTTAWA, ONT.

Perhaps it is not very obvious why the word "Gravity" should have a place on the programme for the Annual Meeting of the Ontario Land Surveyors. However, in a brief presentation of the subject I shall try to justify it. Your activities cover a wide field; some of you are engaged in city surveying as affecting real estate; some similarly in towns and country; others are busy with municipal work—drainage, sewerage and water supply; while others are engaged in Government surveys, running base lines and surveying townships, involving the consideration of the figure of the earth, not only as a sphere, but as approximately a spheroid of revolution; and there are still others who delve into the earth and instrumentally trace the shafts and drifts of the miner.

In all this work the transit is the indispensable instrument; and the first thing you do when you set up the instrument is to level it. The level is a small part of a huge circle with a radius varying from a score or so of feet to a quarter of a mile. The radius is a measure of its sensitiveness. The level is not a bent glass tube, but has its upper inside surface ground with a curvature dependent upon the radius taken, and the merits of a level lie in the uniformity of the curvature, that is, that it represents that of a constant radius. Now, when you start to "level" the instrument what happens? You move the footscrews in order to move the bubble to a certain position; that is, you are exerting a force against some other force that maintained the bubble in its previous position. We naturally ask, what is that force that keeps the bubble in a given definite position, for the liquid within the tube is free to move?

This subtle force is "gravity."

As we grow up from infancy we learn by experience and unconsciously that bodies fall to the ground. The phenomenon is so common that it never raises or excites the least wonder; we never think of it as a phenomenon, but simply take it as one of the things of the earth, like the trees, or houses, or rocks, or water.

But the first time, perhaps at a Christmas, we come possessed of a toy magnet, and play with it, lifting up tacks and needles, our curiosity is aroused. Here is a piece of red-painted metal, not looking or feeling different from many other things, yet in some mysterious way it picks up things, to do which otherwise we must use our fingers. We even see that small iron things are apparently eager to join the painted friend and jump to it. We notice, too, that a large magnet will pick up more tacks than a small one, in short, that it has more force, more attracting power. The curiosity centres in the fact that two inert, dead things will attract each other, without apparently any reason, and such behavior of bodies attracting each other, or one attracting the other, we had not noticed before in any way. When we threw a ball, of course it fell to the ground afterwards—that was natural, everything did that, and that was all there was to it. It never entered our head that there was the slightest similarity between the action of the magnet and the tacks, and the falling of the ball. The familiarity of the latter phenomenon and its never failing, militated against the slightest attention being paid or the slightest wonder being aroused. That things fall we know now to be due, not because it is innate in them to do so, that is, that they can't help themselves, but because of a law—that of gravitation—which in its action is similar to the attracting force, or magnetism, of our magnet. However, the very large majority of the civilized people are in our child-state—they see no force displayed in the falling of a ball, but wonder at the force displayed by a piece of magnetized steel. The existence of gravity as a force and the law governing it were discovered, as you know, by Newton. Let me repeat the Law of Universal Gravitation: "Every particle in the universe attracts every other particle with a force proportional to the quantities of matter in each, and inversely proportional to the square of the distance between them." To return to our level, we have the instrument adjusted, and the bubble in the centre of the tube; this latter, however, is not at all necessary for accuracy; the bubble might stand to one side and still the plate could be horizontal, but it is more convenient to adjust so that the bubble is in the centre when the plate is horizontal. From what has been said it is obvious now that the position that the bubble assumes is the resultant of the forces of all the particles in the universe acting on the liquid within the tube. We may, however, consider as negligible the effect of matter outside of the earth. From this premise it follows that the position of the level is dependent upon the distribution of matter with reference to the station or position of the instrument, and hence if the distribution of the matter be changed the position of the bubble will change, and when we have the instrument adjusted again to "level" then our horizontal telescope will point differently from what it did before when horizontal.

Let us suppose we have a transit set up here, well adjusted and leveled; next imagine Lake Ontario to be drained as it perhaps will be some day in the distant future, then you will find that the level on your instrument is ''out''; if it is pointing in a north and south direction the liquid will have run towards the north, because the pull has been decreased from the south where the lake was, and the bubble will have moved southward. Furthermore this would mean that compared with formerly, sewers that had a very small incline towards the lake would permit the water to run in the opposite direction, apparently up-hill. To further illustrate this, suppose Lake Ontario to be of uniform depth and the bottom to conform to an arc of a circle, about the centre of the earth, if we then draw another arc in the same plane and from the same centre, with a radius equal to the former plus the depth of the water, we will get a line parallel to the former, but we will find that the lake level is beneath this line on account of the less density of water to the surrounding solid matter, and if we remove the water altogether from the basin, our line of levels across the basin will fall below the line of the previous water surface. Or again, imagine a small island in the middle of the lake and a bench-mark there as well as at, say, Kingston, both at the same height above the water. Draw off the water now and run a line of levels between the bench-marks, when it will be found that they are no longer on the same level. Nature in the course of ages has produced many effects like this which we have noted and observed. The work of man is small to produce any appreciable effect on the change of level, yet I am confident that if accurate observations had been made before and after the building of the great Assouan dam that a change of zenith, which is equivalent to a change of level, would have been detected. From what has been said it will be inferred that the curvature of a large, deep lake level is flatter than the theoretical curvature, and that one can see farther on the lake than on the ocean. The deflection of the vertical at the edge of a large lake may amount to several seconds of arc due to the presence of the water instead of the basin being filled with solid matter. The effect of gravity comes into play particularly, aggravatively one may say, in geodetic work and its allied astronomical observations for latitude and longitude. With the greatest care and precision the geodesist and astronomer do their work in the field and have every reason to believe that the triangles will ''close'' and that points determined geodetically and astronomically will coincide. But the fond hope is ruthlessly crushed by the vagaries of the level, our datum plane, upon which all surveyors', engineers' and astronomers' work is based. The ''non-closing'' of the triangles is due to the unequal distribution of matter in the crust of the earth, leaving out of consideration instrumental errors or errors of observation, which are generally small compared with the closing errors. It is scarcely possible to deal with the subject of gravity without referring to the work in connection with "The Great Trigonometrical Survey of India." There is no country on the face of the earth where the complications arising from stupendous mountain masses is more expressed than in India. Fortunate it is that the precision aimed at from the very inception of the work a century ago was of the highest order, and it should be a pride to every Britisher that such monumental work was undertaken for and in one of the dependencies.

Pendulum observations, as you are aware, give a measure of the force of gravity, while our level gives us the direction of that force. The latter tells us nothing whether there is an excess or defect, but only the relative condition, while the former gives the force itself. A certain position of the level might be caused by a defect of matter, say, to the south, or an excess of matter to the north. As a consequence the peculiar phenomenon may arise in the case of a deep crevasse running east and west, as the Colorado canyon, that the observed latitude of its southern edge may be greater than the observed latitude of the northern one.

The chief disturbing factor in India was primarily and naturally referred to the huge Himalayan mass along the northern border, and containing the loftiest elevations on the earth. In 1852 the question was submitted to Archdeacon Pratt of Calcutta, an able mathematician, in order to correlate the astronomic and geodetic operations, i.e., to account for the magnitude and direction of the deflection of the plumb-line.. He concluded from his investigations that the attraction of the Himalayas was completely compensated, that is, that the mountains were not a huge mass resting on the earth as so much extraneous matter, but were in the nature of an iceberg floating in the earth with submerged matter having a defect of gravity or density, and that all discrepancies between astronomical and geodetic results might be attributed to local attractions. It appears from recent evidence that serious objections may be offered to the acceptance of this view *in toto*. The theory that the attraction of the Himalayas was counteracted by an invisible mass was based on the following argument: The observed effect of the Himalayas on the deflection of the plumb-line at the northern end of the Indian arc was 5″.2, while the attraction of the Himalayas considered as a mass superimposed on the earth would be at the above point 27″.8, over half a mile in latitude, as computed by Pratt. In this comparison the influence of the Indian Ocean was considered inappreciable. However, it has now been amply demonstrated that as far as the effect of vast high plateaus on gravity is concerned, it is fairly compensated by defect of matter beneath. A notable case in America are the results of the pendulum observations on Pike's Peak, which rises some

8,000 ft. above the plateau, which in turn is about 6,000 ft. above the sea. All pendulum or gravity observations are reduced to sea-level, and when in this case the attraction of the plateau was neglected and only that of the mountain was considered, the result appears quite normal.

The accumulation of data in India, if it has not yet explained the many anomalies, yet has eliminated many former opinions as to their source, and has led to others more in consonance with the increased facts. Among the more important conclusions is the one that the probable cause of the positive deflections to the north of latitude 24° and of negative deflections to the south, is due to a great underground chain of excessive density, stretching across India for over a thousand miles, and affecting latitude observations for nearly a thousand miles from north to south, masking thereby the true effects of the Himalayas. The effects of the chain are superimposed on those of a far-reaching Himalayan attraction, the latter perhaps deflecting the plumb-line at Cape Comorin, 1,500 miles distant, through one or two seconds of arc.

We see from the short reference made to India what difficulties arise through anomalies in gravity that require adjustment to correlate a geodetic survey with itself and with astronomic observations for both latitude and longitude.

In our geodetic survey recently inaugurated there need be no fear of such excessive anomalies being encountered, at least not to the east of the Rockies, but there will nevertheless be anomalies requiring adjustment. If I might venture to predict regarding the St. Lawrence Valley from Port Arthur to the sea, it would be that, in general, observed latitudes will be less than their theoretical value. This is based on the belief that there is an excess of matter to the north.

In modern astronomic observations for position and in refined geodetic work the errors of observation are less than those introduced by deflections of the plumb-line or anomalies in gravity.

You all recall the observations, that have become classic, at the hill Schehallien in Scotland, by Maskelyne in 1774 for determining the mean density of the earth. The underlying principle in these observations was the change of position of level that the hill would cause, so that observations made to the south of the hill and those to the north would have opposite signs for the corrections. The hill itself was surveyed, thereby obtaining its volume; then from samples of the rock composing it the density was determined, hence its mass. The actual deflections by the hill were directly observed and obtained from a linear connection between the observing stations. The problem stood like this then—we have a given level, or, which is the same thing, the direction of the line at right angles to it—the plumbline, its direction is the result of the pull of the earth as a whole and of Schehallien. How much Schehallien pulls we have determined and how much the earth pulls is dependent upon its mass, and this is the product of its volume by its density, hence our only unknown in our equation is the density, and this readily follows from the above data. Although the result obtained, 4.5, is about a unit too small for the mean density of the earth, yet we must admire the method conceived and carried out nearly a hundred and fifty years ago by the Astronomer Royal. The difficulty of the method is in getting a reliable value of the mean density of the hill from individual samples of the rock at the surface.

In our own country we have some interesting data about the effect of hills pulling out of their normal position the direction of the plumb-line in connection with the survey of the international boundary line along the 49th parallel. I have recently written a paper on "The 49th Parallel," so I will here only refer to one or two of the principal disturbances, and in this case the disturbing factors were obvious, which is not always the case, as I showed in the case of the underground chain in India.

Some of you who have been on surveys in the Northwest will probably recall the Cypress Hills and the Sweet Grass Hills or Three Buttes in Montana, immediately to the south of the boundary line. The greatest difference of station errors at astronomic (latitude) stations was 13″.89 or 1,407 feet, being in a distance of 97 7-10 miles, between the Cypress Hills to the north and the Sweet Grass Hills to the south. The former pulled the plumb-line 5″ .94 northward, therefore the zenith southward, and gave too small a latitude by about 600 feet, while the latter influenced the level in the opposite direction and put the latitude about 800 feet to the north. There are other deflections along the line, but not of such magnitude.

As the Commissioners agreed to accept the astronomic observations, which means the inclusion of the deflection of the plumb-line, as the defining ones for the boundary line, our boundary line along the 49th parallel is not that nice, smooth, uniform curve as depicted on a globe, but a more or less irregular, zig-zag line telling us in unmistakeable terms of the vagaries of gravity on the surface of the earth, and how they affect the work of the surveyor.

DISCUSSION.

Dean Galbraith—I have listened with a great deal of pleasure to this very able paper, and I am also going to take the opportunity of reading the paper. I received not long ago Dr. Klotz' paper on "The 49th Parallel of Latitude." I looked over that, but I have not had time to read it as I should like.

I was going to ask Dr. Klotz about a thing I saw in the papers this morning and also not long ago, the statement that our whole earth has a tidal expansion and contraction, the tidal motion in latitude—I forget now what the place is—being about four or five inches. What I was going to ask was, has Dr. Klotz any idea of the method by which that vertical motion of the earth is measured?

Dr. Klotz—Yes, I can answer that question for you. That determination has been made recently in Potsdam at the Geodetic Institute, and it has been made by means of a horizontal pendulum similar to the pendulum we use for earthquake work. The record is made by a horizontal pendulum, but the principle there is a little the reverse of the ordinary pendulum which we have here, which swings or oscillates. The bob is the thing that is supposed not to move; it is what we call the steady point, and it is the earth that is doing the moving. By the adjustment of this horizontal pendulum, the lower point of the support and the upper one are not quite in the same vertical plane. The degree of sensibility depends upon the angle between the vertical and the points of support, the lower and upper; and by means of this pendulum, which was placed at the depth of about 80 feet beneath the surface of the earth, in order to free it from radiation and so on, the effects of the heating of the earth by the sun in the day time, which only penetrates to a very small depth, confined to several metres, say ten or twelve feet; beneath that the solar daily radiation has little or no effect; and for other disturbances on the surface of the earth the pendulum was placed at the depth of about 80 feet, but Prof. Hecker saw that there was a tidal effect, which Dean Galbraith was just now speaking about, so by means of certain appliances they observed the motion of this pendulum. It is highly sensitive. The pendulum we have in Ottawa reads to about a thousandth of a second of arc—I can read that on it quite readily—that is the deflection. He observed these movements of the pendulum and compared them with the motion of the moon and the sun, just as the observations are taken for the tides, and by that means showed they are clearly the tidal effect made by the moon and the sun. So that our earth is not an absolutely rigid body, which of course had been shown by Kelvin long before, but this was a direct demonstration by a method which had not been attempted before. I think that answers your question.

Dean Galbraith—Yes, it gives me some idea.

Dr. Klotz—The horizontal pendulum which has been introduced of recent years is doing splendid work, especially with earthquakes. There was an earthquake reported from Persia some time ago. Our daily papers all had it that on the 13th January there was a severe earthquake there. They telephoned down to the Observatory to find out whether we had an earthquake, and the matter was referred to me because I have charge of that, and I told them there was no destructive earthquake in Persia or any place else on the earth on the 13th January, because it is utterly impossible for one to take place and not to be registered on our instrument, which is a highly sensitive instrument. The next day in the papers it came out that it was on the 23rd January, and of course we had the record of that.

Dean Galbraith—After the meeting of the British Association in 1897 here the Observatory in Toronto put in a seismograph, and it no doubt did very good work, but two or three years after that we put in a stamp mill within 100 feet of the seismograph. This stamp mill made 90 pounds a minute, and I asked Mr. Stupart what his records were on his seismograph, and he looked over them, and he said, "You haven't been doing anything at all there; the seismograph doesn't show anything." Of course Mr. Klotz knows why it didn't. It was timed to swing about once in ten seconds or thereabouts. I suppose that is about an average to catch earthquakes.

Dr. Klotz—We have them from five seconds to sixty seconds.

Dean Galbraith—A pendulum swinging like that couldn't catch the quick sounds made by this stamp mill.

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DRAINAGE.

A. S. CODE, O.L.S., ALVINSTON, ONT.

The subject of drainage is so largely governed by precedent that although new cases are constantly coming up and drainage is the subject of much litigation, I feel that to add to what has appeared in the papers already read before this Association is a difficult matter.

Drainage is in a state of evolution, as it were, and difficulties are constantly appearing that will tax the ingenuities of engineers for some time.

Cases where, by following a natural watercourse, the fall has been so diminished that a straight drain in a new direction would give better drainage are appearing.

Drains that once gave efficient drainage have been found to be now too small owing to better drainage and consequent increased flow from lands above as cultivation is increased.

The conditions of the soil in the matter of percolation is important, and the gauging of size and capacity often depends on this to a considerable extent. Some soils require considerable under-drainage, others often little more than open drains.

There are many creeks that have been rendered insufficient (owing to increased drainage from lands above) that are being straightened and deepened in order to give good outlet.

It is always advisable in laying out drains to provide plenty of depth, as drains which are deep and narrow are much more easily maintained than those having a broad and flat section. Long stretches of even grades should be sought in order to avoid trouble from flooding.

It is well to observe the sectional area of drains and the area drained, and after having considered the fall, a table which may be of considerable use can be formed. A table thus made will compare very favorably with any formula yet devised.

The placing of earth well back from the sides of drains so as to reduce pressure and provide for future enlargement is advisable, and through the cleared lands it should be spread back from the drain.

A great deal of trouble is caused and the cost of maintenance increased by drains not being completed in accordance with the profile, and it is advisable that the engineer should at least make the final inspection, even if he is not asked to make the progress estimates. The specification should be broad and enforced generally.

It is a matter of regret that witnesses at appeals to Courts of Revision are not receiving better remuneration. At present the Division Court tariff is used, ranging from 75 cents per day if the witness lives within the county and within three miles of the place of trial, to $1.25 for witnesses without the county and more than three miles from the place of trial. For barristers and solicitors, physicians and surgeons, engineers and veterinary surgeons, the handsome sum of four dollars is allowed. There is a splendid opportunity here for some "law reform."

The question of assessment is defined as a question of benefit, but the classification of outlet liability and of injuring liability is but little less obscure in many cases. The benefit must be direct, or by cutting off waters from lands, or by a relief from liability for injury, or there must be an improved outlet provided.

It is well in making assessments to outline in general the sum total of the different classes of the assessments under the three headings, and then proceed to calculate the several assessments to be placed upon the several parcels of land. In this way an assessment may be well defended in the courts, and if it proves to be in error the correction is a simple matter.

Examination of the lands is necessary, with care, in cases where an assessment for injuring liability is to be made, and sectional measurements and locations of artificial work is convenient when evidence is to be given.

The cases where an assessment for outlet liability can be made are, first, where at a lower level a drain exists and the municipality constructing a new drain under the Drainage Act uses the lower drain as an outlet for the waters drained from the upper lands to save the cost of further outlet work, and secondly and conversely, where the work is to be constructed on the lower level and it is necessary for the drainage of these lands by reason of water brought down from the upper lands, by artificial means or through a natural water course.

In the matter of descriptions there should be a clear definition even if metes and bounds are necessary, but there are many cases where the assessment roll will not give the necessary information.

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NOTES ON IRON ORE MINING, BELL ISLAND, NEWFOUNDLAND.

BY W. B. FORD.

The iron-ore deposits occurring upon Bell Island, situated in Conception Bay, on the east coast of Newfoundland, are the most extensive iron ore producing areas at present worked in this country. Bell Island has an area of about 12 square miles, is distant from the mainland three miles at its nearest point, and is connected thereto by submarine cable, and transportation to St. John's, the Capital of Newfoundland, is effected by means of steamer to the mainland, and thence by horse and wagon a distance of nine miles.

The deposits occur in several seams of varying thickness, all of which outcrop on the surface of the island and dip at a nearly uniform rate of about 8 degrees to the northward. The seams continue under the waters of Conception Bay in certain places, which will open up extensive areas for future working.

The ore is a red hematite, having a steel grey metallic lustre when freshly broken, and a decided blood-red streak, specific gravity of 3.82-3.88. The cleavage is very uniform, most of the ore that has not been subjected to pressure breaking down in regular square prismoidal fragments of varying size, the underground ore becoming more massive in structure as the amount of cover increases.

It was only in the year 1895 that the first ore was mined here, although the existence of the ore was known for many years before; the amount shipped to date will exceed 6,500,000 tons. Most of the ore is sent to Sydney, Cape Breton, there to be used in the furnaces of the operating companies. Some of the ore is shipped to England, Rotterdam and Philadelphia; the shipping is performed by steamers capable of carrying six to seven thousand tons of ore, operated under charter to the companies, and the regular schedule of arrival and departures attained by the captains is remarkable, considering the weather which oftentimes occurs on this coast in the spring and fall.

The two main seams, known as the "Upper" and "Lower," are at present being mined, the former by the Nova Scotia Steel and Coal Co., and the latter by the Dominion Iron and Steel Company, and the methods adopted by both companies are to all intents and purposes similar, although the following notes by the writer refer to the workings of the latter company more particularly.

The "surface ore"—that portion available for surface mining—is first stripped of any earth or rock burden covering it, by means of horse and cart, small narrow-gauge dump cars, or steam shovel and dump car work, the spoil banks being made in the mined-out pits or clear of the outcrop. The ore body is then drilled off, invariably by machine drills operated by either compressed air or steam, blasted down and loaded by hand into small, narrow-gauged cars of thirty cubic feet capacity, hauled from the pit by small individual hoisting plants to the main tramways, switched on to the same and sent out to the storage bins at the shipping pier.

There are two double main track surface tramways running from central parts of the mines to shipping pier, a distance of about one and one-half miles each, operated by means of an endless cable, one track being for the loads, the other for the empties; gauge is two feet and distance centre to centre tracks five feet. The main haulage rope is one inch diameter, patent crucible plough steel, six strands seven wires each; it is supported on hardwood rollers and brackets supplemented by cast iron pulleys at the apexes of all vertical curves owing to the increased wear. The bearings of these pulleys are lubricated twice a day and renewed as quickly as worn out.

The tramways follow the general contour of the surface, the grades being adjusted sufficiently to prevent too sudden rises or falls, the alignment being the most particular feature of their construction. Sixty-pound rails are used for the loaded side and twenty-eight for the empty.

Two branch tramways running practically parallel with the outcrop of the seam feed each of the main tramways, the cars being ungripped by hand at the junction points and fed by gravity to the main tramways as occasion requires as regards the loads, and vice versa with the empties. The cars are also delivered to and from all sources of supply in a similar manner.

The loading of the main tramway both with full and empty cars is carefully watched in order to keep the cars as evenly distributed as possible, thereby balancing the line as nearly as practical, and with care little difficulty is experienced in handling an average output of 3,000 tons in ten hours over one tramway.

The deckheads—or points of transfer for the cars from the pits to the tramway system—are so arranged that when the loaded cars are hauled up from the pits and detached from the hoisting cable they run by gravity on to the branch tramway, there to be gripped on to the main haulage cable, the empties being detached from the main cable at some point where they will feed by gravity to the deckhead, there to be attached to the hoisting rope and lowered to the place of loading in the pit.

The general layout of the deckheads and the method of working the several pits, with their system of loading tracks, these latter having to be moved frequently to follow the mining out of the ore, warrants a good deal of careful consideration by the management, and many expedients are availed of in the furtherance of economical handling, as every new pit presents different problems to the others.

SHIPPING PIER AND STORAGE BINS.

These are located on the southerly side of the island, purely from the standpoint of increased shipping facilities, and the ore having been brought out over the main tramways in the cars, is dumped by means of a tipple from a trestle into large storage bins around the outside of which runs a trestle which has acquired the name of "Merry-go-round," a name not always warranted when any slight derangement occurs, and one car is following the other at a distance of fifty to seventy-five feet, at a speed of three and one-half miles per hour, as only the man in charge knows to his cost. This trestle is constructed having a grade just sufficient to keep the cars moving, after being detached from the haulage cable, so that they pass through the tipples, are dumped and then trammed around to the point of connection with empty side of tramway, there to be despatched to the mines again.

The two storage bins have a combined capactiy of about 17,000 tons; they are excavated in the natural rock, and are tapped by means of a conveyor tunnel having a series of rises running up to the bins. In this tunnel is located an endless bucket conveyor which runs from a point underneath the bins to the edge of the cliff of the island, is there supported by trestling until it reaches the discharging end situated in the superstructure of the pier. The discharge is made through a regulating bin and pivoted chute directly into the ship's hold. The buckets hold approximately one-third of a ton each, and travel about 200 feet per minute. The conveyor is driven from the pier end by either steam or electrically driven and geared engines.

An average time consumed in loading a 7,000-ton steamer is three and a half hours, and has been lowered quite frequently.

The topography of the island favors the general layout of the shipping pier and storage bins as described in a remarkable way, and much credit is due the pioneer of these mines, Mr. R. E. Chambers, who adapted these natural features to his use.

The shore of the island at shipping pier has a perpendicular cliff some hundred and fifty feet high, and there is a depth of water sufficient to float any modern-sized steamer within one hundred and twenty-five feet of shore. The discharging sprocket wheel of conveyor is some eighty feet above high water, and the line of conveyor runs on a level into the tunnel, there to tap the pockets. The ground rises constantly from the top of the cliff for a distance of over a quarter of a mile until a point is reached 300 feet above the sea level.

At the time of loading a vessel the conveyor is fed by means of the inclined rises or chutes tapping the storage bins, one being used at a time; the stream of one being regulated by means of gates.

All the ore shipped is despatched during the six or seven months, exclusive of winter, owing to the uncertainty of the weather during the latter season.

The main haulage system is located at the pier, being operated by steam, and runs 6½ miles of double track cableway in the main and branch tramways.

STANDARD MINE CAR.

Practically one type of car is used for the surface and underground mining, and for transportation purposes. It is built of steel throughout (size of box is 5′ 2″ x 3′ 6″ x 2′ 0″ high; overall dimensions 6′ 7½″ x 3′ 6″ x 3′ 3″ high) has a capacity of 30.5 cubic feet, equal to about 1.75 tons of ore.

The gauge is two feet, wheel base the same, diameter of wheels twelve inches; the frame is built up of extra heavy five-inch eyebeams for sills, the bearings being riveted directly to the lower flange; extra heavy channels filled with hardwood are placed transversely to the sills, and act as the bumpers. The body is made up of one-quarter inch plate, all corners being flanged; the drawbars are extra heavy and continuous from one end to the other, and riveted to the car bottom. The gripping device consists of a couple of grip jaws so placed that the lift on the cable is practically nil; these are brought together and grip the cable by means of forged steel bent and pivotted levers, the upper ends being connected by links with a grip nut about two inches square carried on a spindle riveted on the centre of the end of the car near the top. The operation of "gripping" on is very simple; a car fed by gravity from any source of supply takes the main line at a point where the track is lowered a trifle below general grade; this brings the cable between the grip jaws, and the man stationed at this point places a long-handled lever having one end turned around wrench fashion on the grip nut, and by pressing upwards forces outwards the upper end of the grip jaws, which consequently brings the jaws together on

tion, and cars can be gripped "on" or "off" whilst in motion by any active man without difficulty.
the cable. The releasing movement is made in the opposite direc-

UNDERGROUND WORKINGS.

The Dominion Iron and Steel Company have at present four main slopes driven to the dip, three of these are fully developed and equipped, and are capable of producing from 800 to 1,200 tons per day.

The method of working is the "room and pillar" system. Levels are turned off at arbitrary points from the main slope and generally following the strike, the entry being about 12 feet widening out to twenty-five feet or more when some fifty feet from the main slope. Crosscuts are driven to the rise from these levels wherever deemed expedient, rooms being turned off from these parallel to the levels until a certain area is worked out into alternate pillars and rooms, and when occasion permits the pillars are gradually withdrawn and the roof allowed to drop.

The drilling is all accomplished by means of machine drills operated by compressed air, set up on vertical columns and brackets. A drill crew consisting of the driller and helper on an average, set up their machine, drill about forty lineal feet of holes, and take down and remove all their gear, leaving holes all cleaned out ready for firing. Drillers are paid a bonus on tonnage over an arbitrary amount determined by the conditions existing. All drill bits are sharpened by drill sharpening machine, which is found to give good results, besides reducing cost of sharpening.

The blasting, which is all accomplished by the use of electrical batteries, is generally done in the night shift by the blasting crew, who are responsible for the firing of all holes drilled. All blasting batteries are American standard pattern and are carefully tested every day before being put in use.

The explosive in most general use is one and one-half inch 50 per cent. dynamite, one pound of which usually breaks down two tons of ore in heading work; in pillar work the amount per ton used is much less. Great care is taken with the thawing and handling of the explosive, special buildings being used for the storage and thawing of only sufficient for the day's use.

The thawing cans in use are oblong boxes made of heavy galvanized iron fitted with 25 horizontal tubes, in which the explosive is placed, each tube is made long enough to take two sticks, consequently an ordinary 50 lb. box can be treated at one time. The tubes are open at both ends of the can, and the ends have hinged doors which are closed after the insertion of the dynamite. Hot water is poured in from the top and completely surrounds each tube, but does not come in contact with the dynamite in any way. The tubes are thoroughly cleaned every day with a mixture of washing soda and hot water, an operation that is strictly enforced. The blasting crew are allowed only to take sufficient dynamite with them to the mine for the night's work, and after they have examined the drill holes in order to ascertain their freedom from obstructions as well as to estimate the amount of burden upon each hole, they proceed to load the same carefully, forcing each plug well home, the detonator generally being inserted in the second last plug placed in a hole. These detonators are "triple strength" and are inserted in a hole made in the primer by a pointed wooden stick. The dynamite is then well pressed around the detonator, a couple of hitches taken around the plug with the wires, the primer is then carefully placed in the hole, well pressed into place, the remainder of the dynamite is then inserted and finally the tamping. For the tamping nothing but fine powdered dust obtained from "dry holes" is allowed; this is placed in paper cases which have been previously rolled up and inserted in the holes and thoroughly tamped with a hardwood rod as solidly as possible. After having connected up and fired the centre cut and a space of not less than ten minutes having elapsed, the blaster returns to the face and on finding the "centre" properly blown he connects up and fires the side round. It is explicitly laid down in the rules of the company that the blaster is to examine each face that has been fired during the shift, to satisfy himself of the non-existence of any misfired holes, or in cases of any blown-out holes where he is unable to find any trace of the unexploded dynamite he has to report the circumstance to the day foreman before the commencement of the following day's work.

The cleaning up or loading is performed by shovelling by hand into the previously mentioned ore cars, trammed by hand or horse to the nearest point of connection with the haulage system, there to await their turn to be hoisted on "deck." The workings are so laid out that in nearly all cases the loaded cars can be run to the haulage road by gravity, the empty cars being brought back by horses for the more level sections, and small hoisting engines drawn by compressed air upon the inclines.

Very little rock occurs in the underground workings, nearly all of which is hoisted on "deck," there to be removed by hand picking. Each pair of shovellers is given a tag, which they affix to the cars they load; this is removed upon its arrival on the deckhead and a bonus is paid to all shovellers who load over a certain number of cars per shift.

The main haulage from the several mines at present is operated by either steam or electrically driven hoists; by degrees steam is being supplanted by electricity, when each individual mine is fully developed. Both the steam and electrical hoists are of the geared, cylindrical drum, reversible, friction-driven type, designed to give a hoisting speed of 450 feet per minute with a load of 13.5 gross tons. The inclination of the main slope being about 15 per cent., the tracks are carefully laid with 35 lb. or 60 lb. rails, well ballasted. Special care is taken with the laying of all turnouts from the main track. The main slopes are well lighted by electricity, and electric bell signals are used to control the running of the hoists.

Travelling or man roads are driven parallel to the main slope in cases where the seam is not high enough to permit of their being placed overhead.

All pumping is performed by direct acting pumps of varying capacities, operated by compressed air, and in case of long lifts and high heads a relay of pumps and sumps is used.

Timbering, where necessary, is employed, native round sticks being used, and usually consists of two posts and a cap, the latter being flattened and dapped down one inch, where it rests upon the former; in places where the roof is scabby lagging is placed on top of the caps.

All working places are examined by "Face Cleaners" before the commencement of work, whose duty it is to ascertain and report the security of the roof and walls.

The underground bankheads are situated invariably in locations best suited for stocking and reshipping the ore. They comprise the car unloading, crushing and sorting devices. At present they are built of timber frame work on substantial concrete foundations, the receiving buildings proper being well housed in from the weather. The floors are some 35 feet above the receiving track for the ore when ready to ship. The loaded cars are hoisted up to these floors, detached from the loading cable, the empties standing ready are immediately connected to the cable and lowered away to the mine, the loaded cars being emptied through a tipple discharging into bins which feed the crusher; passing through this, the ore is discharged on to a picking or sorting belt, on which it is elevated to a height of about 30 feet and then discharged into a couple of loading bins ready for either dispatching direct to the shipping pier or placing in a stockpile, the latter system being used during the winter or non-shipping season.

The crushers in use are Gates No. 7½, style K, having a capacity of 100 to 120 tons per hour, and seem well able to do the work imposed upon them. Most of the ore comes from the mine in cubes of from six to twelve inches and is crushed to a size that would pass through a three-inch ring. The crushers are belt-driven by means of direct current 90 h.p. motors. Care is taken with the setting up of the crushers at the start, solid masonry or concrete foundations are provided, and the expense appears to be warranted by the little wear shown by the machines, and absolute freedom from breakdown.

The picking belts are Stephens Adamson, rubber surfaced belts 36 inches wide, driven from the head or discharging end through gearing by means of 10 to 15 h.p. direct current motors, travel at a speed of one hundred feet per minute, and are from 100 to 120 feet long. The inclination is about 19 degrees. No trouble is experienced by the sorters in removing practically the whole of the rock, which is dropped into chutes along the side of the belt house and from them discharged into small dump cars which periodically are run out to a gob pile and dumped.

The loading bins are strongly built, have a combined capacity of about 228 tons; they are fitted with four chutes spaced to discharge into as many cars at the same time; the gate of the chute is convex on its face and is secured to a cast steel bracket pivoted at its centre on an axle parallel to the gate; the bracket is extended to form a socket for a lever, by means of which the stream is controlled. They give good satisfaction and two men can load all the whole day's run without difficulty. Many kinds of gates have been tried, but none have given results compared with the kind in use. As mentioned before, during the winter season, the ore is placed in stock piles to be reloaded in the spring; a special all-steel stock pile car is inverted "V" shape, doors are hinged on each side and cars are fitted with automatic door opening devices. Heavy construction is used throughout the make up of the car.

The stock piles after a few months' "stocking" assume large proportions and are perforce wedge-shaped, running up to a height of from 80 to 100 feet. The car hoisted up by means of a hoisting engine runs out upon an outrigger (this being moved ahead from time to time); the doors are opened automatically by means of a tripping device; the car empties itself and returns by gravity to the bins, there to be reloaded. These stock piles are reloaded by means of steam shovels when required in the shipping season; owing to the non-feasibility of loading direct into the small cars, a special loading bin mounted on a standard gauge track receives the ore from the shovel and discharges it into the small standard ore cars. This movable bin is operated on a parallel track to that of the shovel and is kept at a constant distance from the shovel, both being moved simultaneously. It fulfils the double purpose of loading and providing a small storage in case of a shortage of cars.

MAIN POWER PLANT.

The main power plant is situated in a central location for the supplying of compressed air and electricity to the portion of the mines at present most fully developed. It is steam driven, and consists of the boiler house and engine house, the former being a building 118 x 35 feet and the latter 170 ft. x 40 ft.

The boiler house contains three and a half batteries of Stirling water tube boilers, each battery comprising two units of 260 h.p. each having a working pressure of 160 lbs. per square inch. These are operated by natural draft and discharge their waste gases into two stacks 100 ft. long and 6½ ft. diameter, one being steel, the other reinforced concrete. The boiler room contains also two feed pumps, one of which is kept as a spare unit; these supply hot water from a feed water heater to the boilers. The boilers are also fitted with the necessary injectors, obtaining their supply from a 30,000 gallon elevated tank.

The boiler plant is laid out with the intention of the future installation of an ash disposal system operating in a tunnel directly in front of the furnaces. The coal supply offers no special difficulties, as the coal cars are delivered from the main tramways by means of a back balance and are dumped into storage bins immediately outside, feeding into the boiler room. The coal used is imported direct from the coal fields of Cape Breton, being carried in the company's own boats. It is transported over the tramway to the different points in the standard ore cars on their return trip to the mines, consequently the expense of handling is very small.

The engine house contains two Walker horizontal condensing cross compound two-stage air compressors of 3,500 cubic feet capacity, each arranged with inter and after coolers; one Norwalk straight line condensing steam two-stage air compressor of 1,150 cubic feet capacity (the air pressure at present in use is 80 lbs., but the machines are designed for 100 lbs. when run to full capacity); two horizontal Robb-Armstrong engines of 75 h.p., direct connected to 125 k.w. direct current generators; one Bellis and Morcom vertical triple expansion quick revolution engine of 750 h.p. direct connected to Westinghouse 500 k.w. direct current generator; three Walker condensers of a combined capacity to provide for all above machines (excepting the Robb-Armstrong engines, which exhaust into the feed water heater direct). These condensers are of the jet type, independently driven by their own engines of the fly-wheel type. The piping to the condensers is so arranged that any combination of engines can exhaust into either of the condensers.

Two circulating pumps—duplicates of those in boiler house—for the supply of water to the elevated tank, which furnishes the water for all cooling purposes in connection with the compressor units, to the feed water heater, to the supplementary injector supply, and for fire purposes. The pumps are connected to a secondary line of piping leading direct to all points requiring water, thereby preventing delays or damage in case of any trouble in the primary pipe line.

One feed water heater of the Cochrane vertical type operated generally by exhaust steam from the Robb-Armstrong engines, but having also connections from all of the smaller engine units.

The steam piping is designed for a working pressure of 250 lbs.; expansion and contraction is provided for by liberal use of long radius bends at all changes of direction; drainage legs and steam traps are provided at all dead ends. All the larger power units are fitted with steam separators.

Both the boiler and engine houses are constructed of heavy wood framing, carried on concrete basement walls; they are covered with corrugated iron; all the machinery foundations are of concrete resting on solid rock.

The main air lines run from the power plant to the several slopes and convey the air for utilization of all drills and pumps and for the small hoisting engines in use underground; comprises approximately 700 feet of eight-inch and 5,000 feet of six-inch W. I. piping. At each of the slopes they discharge into large receivers, from which the underground main line is taken.

Connections are provided at every point wherever present workings are in operation, and also where future workings are contemplated and laterals are run temporarily from these whenever required.

Expansion and contraction is provided for by means of long radius and "U" bends, and at any low points on the line drain cocks are provided. Care is taken in placing these mains to obtain as regular alignment and uniform grades as practicable.

Auxiliary Plants.—In cases where development work is in progress, or at places remote from central power station, much of the work is done by small individual steam plants of varying capacities. The installation of these is necessarily of a temporary nature, frequent removals having to be made. These furnish the steam for hoisting as well as for drilling and pumping.

Haulage Plant.—As already stated, this is located in the vicinity of the shipping pier, and consists of one half battery Stirling boilers of 260 h.p. with the necessary feed pump, etc. The boiler house building is of brick, timber framed roof with galvanized iron covering; liberal allowance is made for future extension.

The haulage engine is one of the tandem compound Corliss type, of 250 h.p., the main shaft driving, by means of gearing, the haulage gear consisting of separate units for the two main tramways; each unit comprises two grooved cable wheels placed tandem, friction clutch and brake band. The cable operating loaded side of tramway leads on to these cable wheels, passes around each 180 degrees, makes four complete turns and is then led to a bull-wheel on a heavily weighed tension car running on a steep incline, which takes up all the slack rope in the system and then passes on to the empty side of the tramway.

By means of the friction clutches and brakes the engineer can control the running of the lines, which are wired throughout for electric bell signals as well as telephones, thereby enabling quick prevention of trouble in case of mishaps, as liable to happen with this system of transportation as any other.

This plant is being installed at the present time and replaces the existing one located on the pier itself; the intention is to leave the old plant intact and ready for emergency.

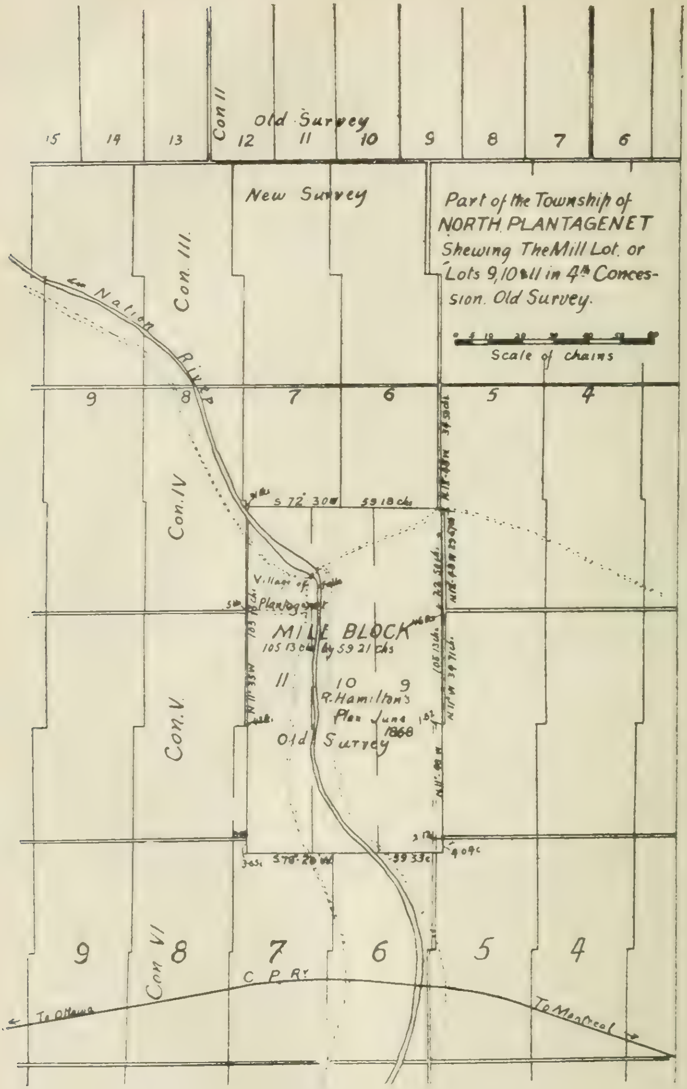
The labor is almost wholly furnished by men from the neighboring districts; many of them combine fishing with mining, following the former avocation in the summer and the latter in the winter. The two mines employ about two thousand men in the summer season and about one-half that number in winter.

[*This Association is not responsible as a body for the opinions expressed in its papers by Authors.*]

"THE MILL LOT" IN NORTH PLANTAGENET TOWNSHIP.

BY E. T. WILKIE, O.L.S.

The Township of North Plantagenet contains two systems of survey. Previous to the year of 1800 the late William Fortune surveyed Concessions One and Two, along the south bank of the Ottawa River, and at the same time, or during the same season, he surveyed three concessions in Alfred which lie adjoining on the east side. In the system of survey which he followed the lots were to be made 19.22 chains wide by about 105 chains long at each edge of the Township, and between the Lots 18 and 19 there was a narrow lot about one-third as wide as the rest of the lots, which was called "a common." At the present time these concessions along the bank of the Ottawa River are known as "Old Survey." After marking off the two concessions in North Plantagenet, Mr. Fortune appears to have abandoned the survey, as far, at least, as this Township was concerned, and it is said reported that the rest of the Township was no good and was not worth the cost of the survey, and made such a report to the Department at that time, but the writer has not been able to find such a statement in his notes; but be that as it may, before Mr. Fortune left he ran back and laid out Lots 9, 10 and 11 in the Fourth Concession, following his system, which three lots took in a falls in the Nation River, which must have appeared to be of some value, for Mr. Fortune obtained possession of the three lots, including the water power, which are now known as "The Mill Lot." A dam was built at the falls, and a saw and grist mill, which have been in use for a number of years, but the dam was purchased and removed for drainage purposes about three years ago. On the accompanying plan "the Mill Lot" is shown in the survey, which was made later on the double front system. Much of this information is taken from a plan made by the late Robert Hamilton in 1868.


Part of the Township of
NORTH PLANTAGENET
Shewing The Mill Lot. or
Lots 9,10 & 11 in 4th Concession. Old Survey.
Scale of chains
Old Survey
Con II
15
14
13
12
11
10
9
8
7
6
New Survey
Con. III.
Nation River
9
8
7
6
5
4
Con. IV
S 72° 30 W
59 18 chs
Village of Plantagenet
MILL BLOCK
105 13 chs by 59 21 chs
11
10
9
R. Hamilton's
Plan June 1868
Old Survey
Con. V.
S 78° 20 W
59 33 c
9
8
7
6
5
4
Con VI
C P Ry
To Ottawa
To Montreal

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TABLES FOR DETERMINING AZIMUTH BY THE POLAR STAR.

BY PROF. L. B. STEWART, DOM. TOP. SURVEYOR.

The subject of azimuth is one of perennial interest, and it is well it is so, as I don't think there is any subject that has been so much threshed out by the Association as this subject. I see I am down on the programme for a discussion of certain azimuth tables. The tables referred to are contained in the January number of the "Canadian Engineer," and I might give a little history of how these came to be in this paper. Some three months ago I received a letter from Mr. James, one of the editors of the magazine, enclosing a number of clippings, one from the Scientific American and another from some local paper containing certain astronomical information, a sketch map of the stars, and the position of the planets and so on. He asked me if I could produce something like that for the Canadian Engineer. On looking over these clippings it occurred to me that they were not quite suitable for an engineering magazine, and I suggested that instead of putting in something of that nature something be put in that would be of value and interest to the profession, so he told me to go ahead and produce something, with the result that is here. Possibly some of those present have seen this; if not, Mr. James has kindly sent up a number of copies of the Canadian Engineer, and we will pass them around amongst those present. It is given at page 185. In the first place, we have a map showing all the stars visible on the 1st February at places in latitude 45 degrees north at 10 p.m. The object of this is to enable anyone interested to become familiar with the positions of the principal stars. Then following that I picked out about twenty of the brightest of these stars and put in their apparent right ascensions and declinations for the same date. Then comes the azimuth table that is referred to in the programme, and this azimuth table contains for latitudes 44°, 48° and 52° at standard times, 8 a.m., 8.30, and so on up to 12 in the evening, the azimuth of the pole star. This table is calculated for the 1st of the month, but it can readily be adapted to any other date, and it is also calculated for the 75th meridian, for places in longitude five hours west. It can, however, be readily adapted to any other longitude and any other date by remembering that any star comes to the same position in the heavens about 3 minutes and 56 seconds earlier each evening than on the previous evening. So that in order to find the time corresponding to any other place and date, we add to the time of the table the difference of longitude first of all the amount by which the longitude exceeds five hours, diminished by .16 of a second for each minute in its amount. That is, the longitude minus five hours is reduced to a solar interval. We must also subtract from the time of the table 3 minutes 55.9 seconds for each day elapsed since February 1st. The method, then, is simply the well-known method of observing the pole star at any hour angle; but instead of observing at any time and then computing the azimuth corresponding to that time, what we do is to take the azimuth already computed and find the corresponding time. It is the reverse of the ordinary process. The result of this is that in the field you can dispense with any ephemerides of the stars, having dispensed with logarithmic tables, and you merely have to exercise a little arithmetic in computing the time corresponding to any one of these azimuths set down in the table. The azimuths are computed for three different latitudes, so that for any other latitude than that contained in the table you can readily find the corresponding azimuth by interpolation. There are three values given, the term, depending upon the second differences amounts to 10 or 12 seconds are, so in a good many cases that could be omitted; unless you have an instrument that reads somewhat closer than single minutes, it would not be necessary to resort to that.

Another use can be made of this table by putting in a column giving the sidereal times corresponding to the standard times contained in the table, and the method is contained in the rule given below. In the first place, there is an example worked out which is as follows: "For example, at a place in latitude 49 degrees 20 seconds north, longitude 80 degrees (= 5h 20m) W., an observer wishes to take an observation for azimuth between 8 and 9 p.m. on February 8th. Here the interpolated value of the azimuth for 8h 30m is 358 degrees 27 minutes 29 seconds, and the corresponding time for the given longitude and date is—

8h 30m 00s
+ 19m 57s (= 20m — 20 × 0.16)
27m 32s (= 3m 56s × 7)
= 8h 22m 25s

The corresponding time for any longitude and date is equal to 8 hours 30 minutes plus 19 minutes 57 seconds; that is, 20 minutes less 20 times .16 of a second, minus 27 minutes 32 seconds, which is 3 minutes and 56 seconds multiplied by seven, the number of days which have elapsed since February 1st. That gives the time at that place and date corresponding to that azimuth. So that all that is necessary in preparing for an observation is a little arithmetic. You merely have to take one of the times of the table and correct it for the longitude of the place and the date. You will always be working in even days, so that the multiplication by the number of days elapsed will be a very small matter.

I have found the same table could be used for determining the correction of a watch on standard time. If one is working on a traverse line or running a long line, he of course knows the direction of the meridian, approximately, at any time, and by turning his instrument into the meridian he can observe the transit of one of the stars whose place is given at the beginning of the article. He observes it with his watch, which we will assume is regulated to standard time. The right ascension of the star gives the sidereal time of the transit. What he wants is standard time. That may be obtained by first of all finding the sidereal time corresponding to his place and date and corresponding to one of the values given in the table. For instance, I will take the example given here, "If at the place and date of the above example the meridian transit of the star Aldebaran be observed at the watch time 7h 37m 12s p.m., to find its correction on standard time;" we take the time eight hours, that is the one given in the table that comes nearest to the observed time, and compute the corresponding sidereal time for the date. The date is February 8th, so that seven days have elapsed since the 1st, and sidereal time gains on mean time about 3m 55s .555 per day. We merely multiply that by 7 and add the product to 4h 46m 20.2s, and we have the sidereal time at eight o'clock in the evening.

Then there is also the correction for longitude; the difference of longitude 20 minutes must be subtracted, the place is 20 minutes west of the 75th meridian, so that we get the sidereal time to be 4h 53m 56.1s. The right ascension of the star is 4h 30m 41.7s. We have the sidereal time with the corresponding standard time. We have another sidereal time also with the corresponding standard time. So we take the difference between the two sidereal times, reduce that to a solar interval, and add it to the standard time, and we have the required standard time. That operation is illustrated here. We find the standard time of transit in that way to be 7h 36m 49.3s. The watch showed 7h 37m 12s. The difference 22.7s is the watch correction on standard time. So that without any solar ephemeris this table can be used for finding the correction of your watch on standard time. Evidently also we could find the standard time the same way by observing the altitude of one of these stars shown in the map and whose place is given in the table. Then from the altitude, the star's declination and the altitude, which would have to be known approximately, we could compute the hour angle of the star, and then combining that with the star's right ascension we would have the sidereal time. Again we would have a sidereal time and corresponding watch time, and the table would give us another sidereal time and the corresponding standard time. By the same process we find standard time by the observations of the star. This map is supposed to be held over the head. A good plan in using the map would be to lie down on your back with a lantern near at hand, and by holding the map, with the centre of it directly overhead, pointing to the zenith and towards the pole star, the map would then show the stars in the positions in which they would actually appear. A few minutes' study would enable one to identify any of the brighter stars shown on the map. I may say that I found a map with the apparent places of a few stars shown on the map very useful a few years ago when out in the Klondike. There, on account of the high altitude of the pole star, I found with my instrument I could not observe it. I had a diagonal eyepiece attached to my instrument, but it had been made afterwards to order, and it didn't allow the instrument to transit, so it was impossible to sight the pole star at all. I had therefore to resort to the method of observing the altitude of the stars. I picked out two stars, Altair and Arcturius. Altair was nearing the meridian at the time I wished to observe, and Arcturius was about four hours west of the meridian, and by observing first for latitude and second for azimuth and time, I was enabled to determine my azimuth. In going into the woods all the data I find it necessary to carry is a star map, such as one of these, and a note book containing the apparent places of a few stars, and then one is ready for any sort of observation for latitude, time or azimuth.

The object of this article also is to enable those who have never made any study of practical astronomy to lay down a meridian line. I have occasionally been approached by geologists who spend a good deal of time in the woods, and who have told me they would like to be told how to lay down a meridian line. I think you will all agree you cannot show a man how to do that in five minutes. A very considerable knowledge of practical astronomy is necessary before one could be trusted to lay down a meridian line for any important work; and one of my objects in this article has been to give a method that would enable anyone with only a knowledge of arithmetic and by following the rules laid down to determine the direction of the meridian. He would have to understand the use of his transit, and, knowing that, he would be able to take what is given in this article and determine the direction of the true north.

Discussion.

The President—Is this article as published in the Canadian Engineer complete and in the best form for us to put it in our Proceedings?

Prof. Stewart—The table will reappear each month. I made an arrangement for preparing this each month for appearance in the Canadian Engineer, and it will be corrected and brought up to date. There will be a new star map each month for the month in question. I am just preparing one now for March, and it will appear on Friday next. So that the table, once the month is over, would be useful probably for another month, but that is all. The table could be used no doubt for two months for determining azimuths, but there would be no object in publishing it, as a new one will appear each month in the Canadian Engineer brought up to date.

Prof. Galbraith—If you have a set of these for any year, would it work for the next year?

Prof. Stewart—It would answer approximately. In fact, I have told Mr. James to put away the one for February, and it will answer for next February, and the twelve would make a very useful little book of maps to carry into the field. It would answer approximately for the whole year, and it would enable anyone to very soon become familiar with all the brighter stars.

Mr. Fawcett—The azimuth given as shown for 10.30 would show that the star was about its western elongation.

Prof. Stewart—Yes. There is another quantity given in the table headed with the small letter "a." That column contains the error in azimuth due to an error of one minute in time, and it would show anyone at a glance just how closely he would have to know the time in order to determine his azimuth with any desired degree of precision. You can see by the way it diminishes when the star is coming near elongation, and when it changes its sign it goes through the position of elongation. When near elongation it amounts to only one second. An error of one minute in time will amount to only an error of one second in azimuth.

Prof. Galbraith—How would the accuracy of your method compare with that of the ordinary surveyor's methods for determining azimuth?

Prof. Stewart—It would depend altogether on the accuracy with which he knows his time, and that is indicated by the column I have just referred to. If he knows his time to within ten seconds, or even within half a minute, he would be able to lay down his meridian line at any time with all the accuracy that a surveyor ever requires.

The greatest value of that quantity (a) is about 30 seconds, when the star is crossing the meridian say in latitude 45° N., it takes about two minutes of time to change its azimuth by one minute of arc. One minute of time there would amount to about 30 seconds change of azimuth. So that you may say generally as long as he knows his time within half a minute it would be quite close enough for determining azimuth by the pole star.

Mr. Fawcett—I suppose if a table like that were to begin about five o'clock in the winter months, so that a person could use it in daylight, it would be early enough.

Prof. Stewart—I thought possibly most surveyors would be using this during the summer, and then eight o'clock is early enough for taking an azimuth observation. It might, of course, be extended to about seven o'clock say. In the summer months it is still daylight at seven, and at the same time you can often see the pole star.

AGREEMENT made this .... day of .... A.D. 19
BETWEEN

ONTARIO LAND SURVEYOR,
hereinafter called the Employer, and of
hereinafter called the Employee.

The Employee hereby agrees with the Employer :

To enter into the service of the Employer and to faithfully serve him in the capacity of
for a period of from the date of this agreement in connection with surveys to be performed by the Employer for the Government of the Province of Ontario in
or such shorter period as shall prove sufficient for the completion of said surveys ;

To devote his entire time to such employment and to obey the orders and directions of the Employer, his assistant or assistants, or any person under whose charge the Employer may from time to time place him, and to perform with all due despatch and punctuality and to the best of his skill and ability all such work as the Employer or his assistant or assistants or other person as aforesaid shall require him to do ;

And also at all times to conduct himself honestly, faithfully and properly in the course of such service ;

And also not to leave the service of the Employer or enter into the service or employment of any other person during such period without the written consent of the Employer.

And the Employer, in consideration of such services, agrees to pay to the Employee wages at the rate of
Dollars per
month from until the completion of such service and to pay his actual travelling expenses (second-class railway fare) from
to

Provided that if the Employee shall be guilty of any misconduct in his service or shall commit any breach of this agreement he may at any time be discharged by the Employer, and in such case, or in case the Employee leaves the service of the Employer before the expiration of the term of service as above mentioned, he shall forfeit to the Employer one-third of all wages which may then have been earned by him and also the amount of all moneys expended by the Employer in bringing the Employee to the place where said work is to be performed, (including travelling expenses, board, etc.)

In any event the wages payable under this agreement shall not become due or payable until the completion of said surveys by the Employer.

In witness whereof the parties hereto have hereunto set their hands.

WITNESS :

O. L. S. PRELIMINARY EXAMINATIONS, 1909.

ALGEBRA AND LOGARITHMS.

1. Investigate the rule for finding the G. C. M. and the L. C. M. of algebraical quantities.

(a) Find the G. C. M. of

$6x^4 - 7x^3 - 13x^2 + 19x - 6$ and $x^3 + 2x - 1$.

(b) Find the L. C. M. of $(x+1)(x^2-1)$ and $x^2 - 1$.

2. Show by examining the square of $a + b$, how the square root of an algebraical quantity can be found. Find the square root of

$25x^4 - 30ax^3 + 49a^2x^2 - 24a^3x + 16a^4$.

3. Explain the difference between an identity and an equation.

(a) Solve the equations

$$\frac{5x^2 + x - 3}{5x - 4} - \frac{7x^2 - 3x - 9}{7x - 10} = \frac{x - 3}{35x^2 - 78x + 40}$$

(b) $$\frac{x + a}{x - a} - \frac{x - a}{x + a} = \frac{b + x}{b - x} - \frac{b - x}{b + x}$$

4. Find the relations between the roots and coefficients of the equation $ax^2 + bx + c = 0$.

(a) Solve the quadratic equations

$$\frac{5x}{21}(x + 1) - \frac{1}{7}(2x^2 + x - 1) = \frac{4}{35}(x + 1).$$

(b) $$x^2 + y^2 = 65$$
$$xy = 28.$$

5. Gold is 19¼ times as heavy as water and silver 10½ times. A mixed mass of gold and silver weighs 4160 ozs. and displaces 250 ozs. of water. Find the proportion of gold and silver in the mass.

6. Define the terms common logarithms, characteristic and mantissa.

Prove the following :

(a) $\text{Log}_x\, ab = \text{Log}_x\, a + \text{Log}_x\, b$

(b) $\text{Log}_x\, \frac{a}{b} = \text{Log}_x\, a - \text{Log}_x\, b$

(c) $\text{Log}_x\, a^m = m\, \text{Log}_x\, a$

(d) Write down the characteristics of 48, .00048 and $\sqrt[7]{.00048}$.

7. Find by logarithms the value of

(a) $\frac{7.891}{.0345} \times \sqrt[7]{89312.7}$

(b) Find value of tangent 16° 18′ 30″ × $\sqrt{\frac{3}{.0876}}$

ARITHMETIC.

1. Add $100\frac{2}{5}$, $64\frac{5}{9}$, $\frac{3}{5}$ of 701.

2. By how much does the difference of $5\frac{23}{32}$ and $2\frac{3}{7}$ exceed the sum of $\frac{5}{8} + \frac{5}{14} + \frac{1}{8}$?

3. Find the continued product of $\frac{95}{116}$, $\frac{1}{21}$, $\frac{87}{153}$, $\frac{126}{190}$ and $\frac{4}{7}$ of $1\frac{2}{5}$.

4. Find the square root of 167.9616, 28.8369, 57648.01.

5. Find the cube root of 2406104, 69426531, 8365427.

6. A person buys 400 yards of silk at $384, and sells 300 yards at $1.32 per yard, and the rest, which is damaged, at 48 cents a yard ; find how much per cent. he gains or loses ?

7. A person invests $9000 in Bank Stock at $163, which pays yearly dividends of 12 per cent. and sells out when it has dropped to 157 ; how much does he lose by the transaction ?

ENGLISH GRAMMAR.

1. What was the "Middl English" period ? Mention some important works written at that time.

2. Define English grammar, orthography and syntax.

3. How many parts of speech are there ? Classify them.

4. What is a phrase ? Give instances of adjective, adverb and conjunction phrases.

5. What parts of speech are subject to inflection ? Indicate some of these inflections.

6. Into what two great classes are verbs divided ? Distinguish between them.

7. Name the degrees of comparison in adjectives. Compare : ill, late, nigh, much.

8. From what sources are the following words derived : Kettle, epidemic, surgeon, short, deacon, desk, glen, swain, banner, barber, jolly, plunder, curry, hammock and hussar.

MENSURATION.

1. Draw diagram of the following: Triangle, rectangle, parallelogram, and give rules for finding area of each.

2. Draw diagram of a trapezium and a trapezoid and give rules for finding area of each.

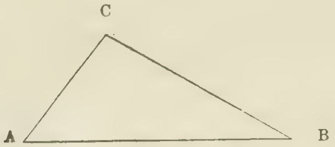
3. Give the rule for finding area of a regular polygon.

4. Draw an irregular polygon and show how you find area.

5. Give the rule for finding circumference of a circle and for finding area of a circle.

6. Give rule for finding solidity of rectangular bodies.

7. In a triangle A.B.C. the length of the side A.B. is 10.00 ch's, the angle A.B.C. 40 degrees 30 minutes, the angle C.A.B. 70 degrees 25 minutes; give the length of the sides A.C and C.B.



EUCLID.

1. Give the several names of three sided figures and define each of them.

2. To bisect a given rectilineal angle, that is to divide into two equal angles.

3. If four straight lines meet at a point so that the opposite angles are equal, these straight lines are two and two in the same straight line.

4. If a side of any triangle be produced, the exterior angle is equal to the two interior and opposite angles; and the three interior angles of every triangle are together equal to two right angles.

5. If a straight line be divided into any two parts, the rectangle contained by the whole and one of the parts is equal to the rectangle contained by the two parts, together with the square on the aforesaid part.

6. In a circle the angle in a semi-circle is a right angle; but the angle in a segment greater than a semi-circle is less than a right angle; and the angle in a segment less than a semi-circle is greater than a right angle.

7. The straight line drawn at right angles to the diameter of a circle from the extremity of it, falls without the circle; and no straight line can be drawn from the extremity, between that straight line and the circumference, so as not to cut the circle.

8. To describe a square about a given circle.

TRIGONOMETRY.

1. Define the terms sine, cosine, tangent, secant, cosecant, versed-sine and coversed-sine. Illustrate by means of a diagram.

2. The angles of a triangle are in arithmetical progression, and the greatest is double the least. Express the angles in degrees, grades and circular measure.

3. Prove the following :—

$$\tan A + \tan B = \frac{\sin (A+B)}{\cos A \quad \cos B}$$

$$\sin A = 2 \sin \tfrac{1}{2}A, \cos \tfrac{1}{2}A.$$

4. The altitude of a tower is observed to be 30 degrees at the end of a horizontal base 100 yards measured from its foot. Find the height of the tower.

5. Two sides of a triangle are 80 and 100 feet, the included angle 60 degrees. Find the other angles.

6. One side of a triangle is half another and the included angle is 60 degrees. Find the other angles.

7. Any two sides of a spherical triangle are together greater than the third side; and the sum of the three sides is less than the circumference of the circle.

8. State Napier's rules of circular parts and explain how they are applied in the solution of right angled triangles.

9. (a) Give formula or rule for solving a spherical triangle having given the three sides.

(b) Give formula for solving spherical triangles having given two sides and the included angle.

LINEAR DRAWING.

1. The representative fraction of a plan is $\frac{1}{2376}$, what is the scale?

2. Construct a scale for a plan whose representative fraction is $\frac{1}{1320}$ to read chains. Show the method of construction and print the denomination of the scale on it.

3. Draw a regular hexagon whose side is 1¼ inches and inscribe a circle in it. Show the construction in dotted lines.

4. Draw five parallel lines half an inch apart, the first line heavy and five inches long, the second medium and four inches long, the third fine and three inches long, the fourth simple dots and two inches long, the fifth chain dots and one inch long.

5. Show how to indicate on a plan, hills, water, trees, roads and railways, and print the names of the various objects.

6. Take three points A.B.C., make A.B. = $1\frac{1}{2}$ inches, A.C. = $2\frac{1}{2}$ inches, B.C. = 2 inches and describe a circle passing through these points.

7. In a right angled triangle a perpendicular is let fall from the right angle to the hypoteneuse and divides it into two parts 4 inches and 1 inch respectively. Construct the triangle.

8. Draw lines containing angles of 15°, 30°, 45°, 60°, 120°, without the aid of a protractor.

CANADIAN HISTORY.

1. Who are supposed to have been the first inhabitants of America before the American Indians? Give reasons for supposing them to have been quite civilized.

2. Give the names of the principal tribes of North American Indians in about 1492. How were they located, describe them as to their habits, etc., etc.

3. Which European nation first occupied Canada, when and how did it pass into the control of England?

4. Describe what is known as the "Quebec Act," its date, how it treated the French as to their religion, political rights, etc., etc.

5. State the circumstances which led to the "rebellion of 1837" and its effect on the form of government.

6. When was the Dominion of "Canada" formed. Under what circumstances and what was its effect?

GEOGRAPHY

1. Name the principal mountain ranges in North and South America, the principal water-sheds formed by these ranges, and the large rivers in each water-shed.

2. What are the European possessions on the Continent of Africa and the climatic features and leading productions and exports of each of these possessions?

3. Name the principal islands on the Atlantic Coasts of North and South America, the political division to which each of the groups belong, and the leading production of each.

4. Give the boundaries of the Provinces of the Dominion and the location of the territories, also the Capital of each Province and the principal river in each.

5. Name the Counties in the Province of Ontario bordering on Lake Huron and Lake Erie, and also ten of the leading cities and towns of Ontario and the lines of railway passing through each of the cities and towns.

6. A traveller takes a trip from Montreal westward to Pekin, China, via C.P. Railway and ocean steamer. Enumerate the principal rivers and cities he would pass in his route and the approximate distances he would travel by land and water.

FINAL EXAMINATIONS.

PLANE TRIGONOMETRY.

1. Explain the methods of measuring an angle by means of degrees and circular measure.

(a) Find the circular measure of an angle of 42 degrees, and the angle whose circular measure is $\frac{5}{6}$.

(b) Define the meaning of sign, tangent, secant and compliment of an angle, and prove that in a triangle A. B. C. the sign of $(90^\circ - A) = \text{Cos } A$, $\text{Sec } A = \sqrt{1 + \tan^2 A}$

2. Taking the radius of the earth as 3960 miles, find in circular measure, and also in degrees, the angle subtended at the earth's surface by the radius.

3. In a plane triangle A. B. C. prove the following :

(a) $$\frac{a}{\text{Sin } A} = \frac{b}{\text{Sin } B} = \frac{c}{\text{Sin } C}$$

(b) $a^2 = b^2 + c^2 - 2\,b\,c\,\text{Cos } A$.

(c) Area of triangle $= \frac{1}{2}\,b\,c\,\text{Sin } A$.

(d) Given $a = 13$, $b = 14$, $c = 15$, find the area of the triangle and Sin A.

4. Two posts on the bank of a river are observed from the opposite bank. When the observer stands immediately opposite to

one of the posts they subtend an angle of 60°. When he has walked 60 feet directly away from the river they subtend an angle of 45°. Find the breadth of the river and the distance between the posts.

5. In a triangle A. B. C. given $a = 25$, $b = 37$, $c = 48$, find B.

SPHERICAL TRIGONOMETRY.

1. Explain the meaning of the terms spherical triangle, polar triangle and spherical excess.

2 In a spherical triangle given A = 66° 30′, B = 27° 40′, $a = 87°$, find b and c.

3. Given $b = 74° 10′$, $c = 58° 40′$, A = 84° to find a.

CURVES.

1. Define the following terms :

Degree of Curve, Radius of Curve, Angle of Intersection, Deflection Angle, Tangent distance, Simple, Compound, Reversed and Easement Curves.

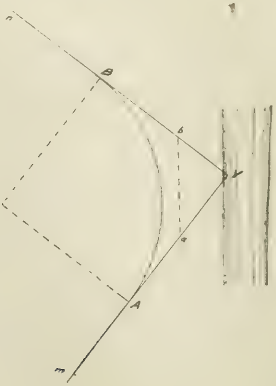
2. The point of intersection of two tangents is at station 623 + 22, the angle of intersection is 26° 56′. The curve is a 6° curve.

Find (a) Radius of curve and length.

(b) Tangent distance.

(c) Stations for the P. C. and E. C. and deflection angle for the first full station beyond the P. C.

3. Find the long chord 'and the middle ordinate for a 4° 30 curve with a central angle of 40° 30′.



4. In a case shown in diagram when the point of intersection is inaccessible, *a b*, was measured as 476° 25′, the angle V *a b*, was measured as 24° 18′, and the angle V *b a* as 34° 22′. The curve is to be a 3° 30′ curve.

Find the radius of the curve and distance of P. C. and E. C., viz., the points A and B, from *a* and *b*, and also the tangent distance V A.

5. Explain how you would find the middle ordinate of a curve.

(a) Find the middle ordinate of a 30 foot rail for a 20° curve.

PRACTICAL ASTRONOMY.

1. Define the terms upper culmination, lower culmination, meridian passage, azimuth, amplitude, vertical and prime vertical circles, equinoxial, vernal equinox, right ascension, solstitial colure.

2. One tropical year = 366.2422 sidereal days
Ditto = 365.2422 solar days

Find (a) The difference in time between a mean solar and a sidereal day.

(b) If mean solar and sidereal time are together on March 22.6, what will be their difference on July 28.2.

3. The observed altitude of Polaris at upper culmination was 40° 15′ 46″.8, and at the lower culmination 37° 33′ 56″.6. What was the latitude of the place?

4. The latitude of Toronto is given as 43° 40′. What should be the apparent time of sunrise on June 21.

5. On Jan. 12th, 1909, in Lat. 43° 06′, Long. 79° 26′, the observed altitude of the sun's right upper limb ⊙ was 12° 35′ 30″, and horizontal circle reading 15° 38′ 15″. Five minutes later the observed altitude of the lower left limb ⊙ was 10° 35′ 15″, and horizontal circle reading 16° 13′ 30″, while the horizontal circle reading on a reference object was 0° 00′. What was the bearing of the latter? (Given the sun's Dec. 21° 38′ 42″ S.)

6. In No. 6 the times of observation being by a watch 3 hrs. 39 min. and 3 hr. 44 min. respectively, find the watch Cor. on Standard time, the equation of time being + 8 min. 26 sec.

7. Sept. 5th, 1909—

Fourth Meridian, Lat. 50° 08′ 08″, Long. 110° W.

Sidereal time 14 hr. 59 min. 56 sec. (corrected).
Horizontal circle reading on line 0° 00′
Ditto on Polaris 0° 43′ 48″
Stars Declination = 88° 48′ 52″ . R. A. = 1 hr. 26 min. 56 sec.

Find the correct bearing of the line.

8. Formulæ for Azimuth at elongation of a star is

Sin. Az. = Cos. Dec. Sec. Lat.

And for time Cos. T. = Cot. Dec. Tan. Lat.

Deduce the above equations.

MINES ACT, ETC.

1. (Re Mining Act). State law as to and show by lettered diagrams the different dimensions that regular mining locations may be laid out and how, when they border on lakes and rivers.

2. (Re Drainage Act). State law as to and show particularly how the different forms of assessment are made.

3. (Re Ditches and Watercourses Act). State laws as to and how in a supposed case, the engineer makes his award.

4. (Re Registry Act). State laws as to subdividing into town lots, land, and how plans are to be prepared. Give forms of certificates required. In cases for County Registry Office and Office of Master of Land Titles, etc.

5. How are public roads established and give the width they may be made, and by what authority ?

GEOLOGY AND MINERALOGY.

1. To what processes of earth building do the following terms refer ? Physiographic Geology, Lithological Geology, Historical Geology, Dynamical Geology.

2. Illustrate by diagram the following geological terms: Anticlinal, synclinal, monoclinal, dip, strike, fault, denudation, inconformable strata.

3. Name some examples of igneous rocks, metamorphic rocks, calcareous rocks, and state where they may be found in Canada.

4. Construct a table showing the conventionally adopted periods of the earth's history as found in Canada.

5. Where in Canada do we find rock belonging to the following formations ? Laurentian, Trenton, Utica, Hudson

River, Medina, Clinton, Niagara, and name some of the characteristic fossils found in each.

6. Where in Canada do we find the following economic minerals? Gold (quartz and placer), Silver, Iron, Copper, Nickel, Lead, Mica, Graphite Coal, Asbestos, Salt, Apatite.

7. How would you distinguish Gold from Copper Pyrites, Galena from Blend, Calcite from Gypsum, Graphite from Mica.

MENSURATION AND DIVIDING OF LAND.

1. The northeast quarter section eleven in the township of Rose containing 160 acres, was owned by A. He sold the northeast quarter of this to B, subsequently he sold 60 acres to B to be laid off in a strip of equal width around the part previously sold. Required the width of this strip. Subsequently he again sold to B 25 acres to be laid off in a strip of equal width around the parts already owned by B. Required the dimensions of this strip?

2. A man owns lot 35, concession 4, township of A. The south limit bears due east and west and is 22 chains 50 links wide between original posts, the east limit bears N 5 degrees W. 81 chains, the west limit N. 10 degrees 30 minutes E. 83 chains 30 links. He sells the east half of the area of the whole lot. You are called on to lay this out. Give the area of each part with the dimensions and courses.

3. A man owns a farm containing 400 acres in a square block. He has four sons and one daughter. To her he gave 100 acres off a corner of his farm in a square form, and wishes to divide the rest equally, and all of similar shape among his four sons. Find the dimensions of each portion.

4. Let B A bear south 30 degrees east, B C north 80 degrees east. A fence is to be built on a due north course from some point in B A to part off one acre. Find the distance from point B to point F, where it is to start?

5. At High Falls, on Current River, there is a chute 25 feet in height, for two miles above the chute the average width of the stream is 100 feet, with an average depth of 5 feet. The current is 4 miles per hour.

(a) What amount of horsepower could be developed with a 25 foot head?

(b) Describe how you would measure the flow or rate of current in a stream?

ALGEBRA.

1. Find the G. C. M. of

$3x^3-7x^2y+5xy^2-y^3; \quad x^2y+3xy^2-3x^3y^3; \quad 3x^3+5x^2y+xy^2-y^3.$

2. Solve completely the equation

$$2x^5+x^4+x+2 = 12x^3+12x^2$$

3. $x^3-y^3=91, \; x^2+y^2=61$

4. $$x^2+y^2(1-xy)^2=14$$
$$xy(x+y)=6$$

5. Give the formula for finding the sum of n terms of a series in arithmetical progression. The first and third terms of an arithmetical progression are 22 and 14 respectively, how many terms must be taken that the sum may be 64 ?

6. If x—a, y—a, z—a, be in geometrical progression, prove that twice y—a is the harmonic mean between y—x and y—z.

7. A grocer has two weights, one as much over a pound as the other is under a pound, and he finds that on selling 511 ℔s. 14 oz. of tea at 2s. 6d. a pound he gains £2 more by using the lighter weight than he would have done by using the heavier. What were the respective weights ?

8. State and prove the formula for finding the number of balls in a rectangular pile.

Find the number of balls in a rectangular pile of 8 courses, the number in the uppermost row being 5.

9. Extract the cube root of

$$x^3+\frac{8}{x^3}-12x^2-\frac{48}{x^3}+54x+\frac{108}{x}-112$$

10. Expand in a series of ascending powers of x.

$$\frac{1+2x}{1-x-x^2}$$

GEOMETRY.

1. Describe a parallelogram that shall be equal to a given triangle and have one of its angles equal to a given rectilineal angle.

2. From one extremity of the base of an isosceles triangle a perpendicular is let fall on the opposite side of the triangle. Show that the angle made by this line with the base is half the vertical angle of the triangle.

3. If a straight line be divided into any two parts, the squares on the whole line and on one of the parts are equal to twice the rectangle contained by the whole and that part together with the square on the other part.

4. Prove that the square on any straight line drawn from the vertex of an isosceles triangle to the base, is less than the square on a side of the triangle by the rectangle contained by the segments of the base.

5. (a) If a point be taken within a circle from which there fall more than two equal straight lines to the circumference, that point is the centre of the circle.

(b) In a circle the angle in a segment greater than a semi-circle is less than a right angle.

6. Draw a chord in a circle so that it may be double of its perpendicular distance from the centre.

7. Inscribe an equilateral and equiangular pentagon in a circle.

8. Inscribe a circle in a given sector of a circle.

9. Similar triangles are to one another in the duplicate ratio of their homologous sides.

10. Describe a rectilineal figure which shall be similar to one and equal to another rectilineal figure.

SURVEY ACT.

1. Define a "Municipal Survey." Give your method of procedure upon receiving instructions to make such a survey.

2. Describe a "single front" concession. What is the governing line therein? When was this system of survey instituted?

3. Give a description of a township laid out with "double front" concessions. At what date was this system of survey adopted?

4. What are "proof lines"? When are they used? Illustrate by diagram.

5. What do you understand by "alternate concessions"? Give an instance of a township laid out in this manner.

6. Describe the various sectional systems of survey up to the present date.

7. How were the townships of Barton, Saltfleet, etc., laid out?

8. In those townships laid out in accordance with the Dominion Lands System of Survey, if a township corner was lost, how would you proceed to locate it ?

LEVELLING.

1. What is a level surface, and when are points in a line said to be on the same level. How is accuracy secured in levelling instruments (in their manufacture) ?

2. State different methods of correcting the levelling instrument.

3. State the difference between true and apparent level. Deduce a formula for finding this difference.

Find difference between true and apparent level for a distance of 660 feet, taking the mean radius of the earth to be 3,968 miles.

4. Show the form of field book, how it is kept and how reference is made to datum line, bench mark and turning points.

Show by the field book how levels are taken over rough ground, making entries up to 10 or more stations.

5. How would you take levels for a topographical plan. State procedure.

PRINCIPLES OF EVIDENCE.

1. What is the meaning of and value of these kinds of evidence ? Direct, indirect, heresay, traditional, oral, documentary.

2. When were surveyors first empowered to administer oaths ? And for what purposes ?

3. Assume a case of a lost lot post in a township and write affidavits such as would enable you to reproduce the lost corner—(a) direct, (b) indirect, (c) disinterested, (d) hearsay.

4. State the law and procedure as to Ontario Land Surveyors taking affidavits.

5. What plans, field notes, etc., can be used as evidence?

BOTANY.

1. Name the chief parts of a plant.

2. Name the four parts that make up the flower leaves.

3. (a) What is the chief business of the flower ?

(b) Name the essential organs.

4. Name at least six varieties of evergreens that are found in Northern Ontario.

5. Name at least ten varieties of deciduous trees that are found in Northern Ontario.

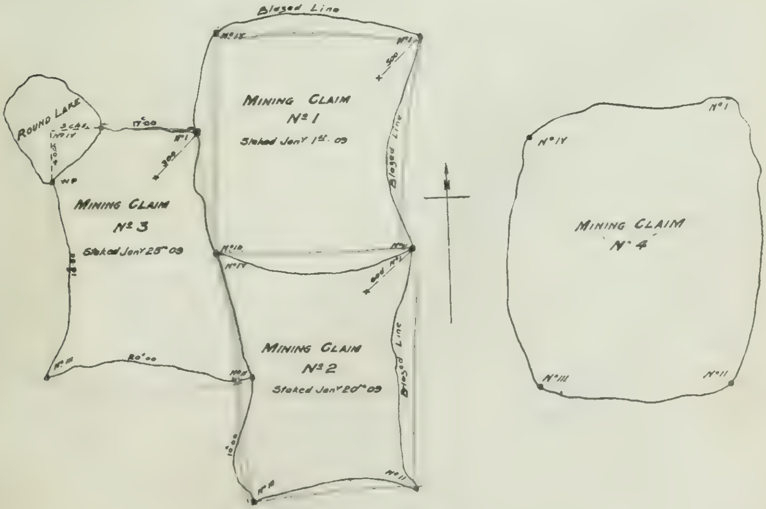
6. Name the chief varieties of commercial timber that are common in Ontario, south of the Georgian Bay and Lake Nipissing.

7. State the approximate proportions of nourishment trees derive from the soil and the atmosphere.

8. What timber in Northern Ontario do you consider the most suitable for railway ties ?

DESCRIPTIONS IN MINES ACT, ETC.

The Diagram shows three Mining Claims staked out on January 1st, 20th and 25th respectively, which claims have been recorded as Nos. 1, 2 and 3 respectively under the Mining Act of Ontario.



The irregular outlines indicate the position of the blazed lines as marked on the ground by the prospectors.

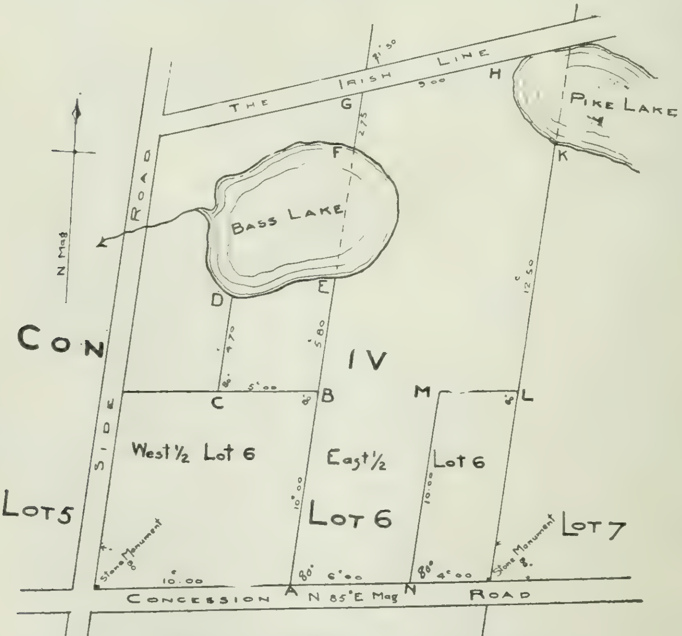
1. Draw upon the Diagram the true position of the boundaries of each of the Claims, etching them thus—ıııııı

2. Write a description by metes and bounds of Claim No. 3 ; assume bearings, distances and area.

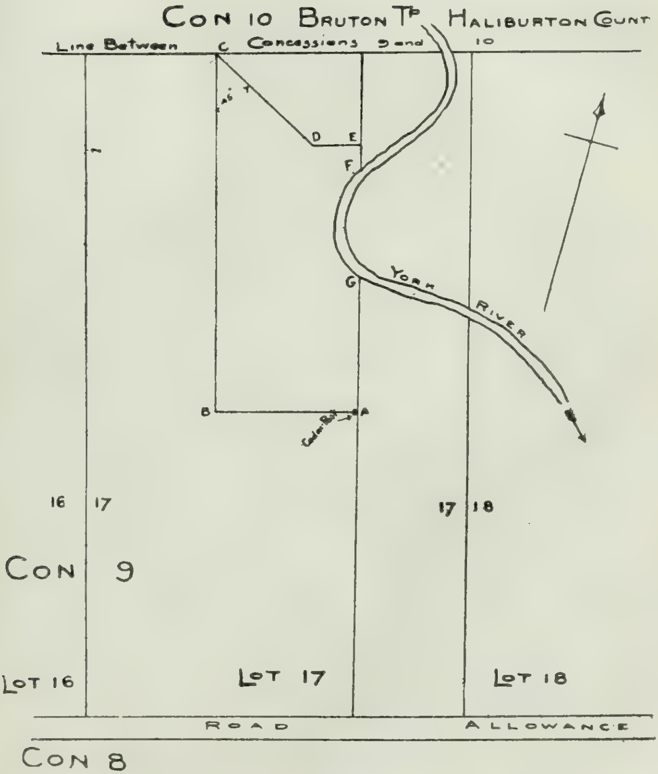
3. Claim No. 3 is intended to cover land under the water of part of Round Lake. How would you determine the true position of the N. W. angle of Claim No. 3. On the original diagrams the bearings are all given, North and South Asty and East and West Asty, length of each side 20 chains.

Claim No. 4 on being surveyed is found to exceed in area the area prescribed for a regular claim, and the Minister has directed that it be reduced and resurveyed. How would you proceed ?

Assuming that the distance between Post No. I. and No. II. is 22 chains, and between No. II. and III. 21 chains, and between Post No. III. and No. IV. 19 chains, draw on the Diagram the boundaries of the claim as reduced, etching the same.



Describe by Metes & Bounds the figure
A B.C D E F.G H K.L M.N. excluding the water give
Astronomical bearings the Con Road being
N. 85° E. Mag and Variation 5 degrees East



Write Description of the property A.B.C D.E.F.G giving Imaginary bearings and distances.

BY-LAWS OF THE

Association of Ontario Land Surveyors

AS REVISED 1899

(To take the place of all previous By-Laws passed by the Association.)

Definitions.

Definitions in the following By-laws as defined by the "Ontario Land Surveyors' Act."

The word	"Association"	means	The Association of Ontario Land Surveyors.
"	"Council"	"	The Council of Management.
"	"Board"	"	The Board of Examiners.
"	"Chairman"	"	The Chairman of Council.
"	"Secretary"	"	The Secretary-Treasurer.

PREAMBLE.

Authority for By-laws.

The following By-laws are enacted under the powers granted by the "Act respecting Land Surveyors," Cap. 180, R.S.O., 1897.

THE ASSOCIATION.

Annual Meeting of Association.

1. The Annual General Meeting of the Association shall be held (as provided by the said Act) in the City of Toronto, on the fourth Tuesday in February in each year, at such place as may be selected by the Council.

Special Meetings.

2. Special meetings of the Association may be called by the President, or shall be called by him at the written request of ten or more members.

Notice to be given by Secretary.

3. Due notice of such meetings shall be given by the Secretary to each member of the Association by circular letter posted to his registered address at least 10 days before any such meeting.

Constitution of quorum.

4. Fifteen members shall form a quorum at any meeting of the Association, for the transaction of business.

THE COUNCIL.

5. In addition to the duties assigned to the Council by the said Act, it shall have the direction and management of all the affairs of the Association, and shall appoint the several Standing Committees and name the Chairman of each. Duties of Council.

6. There shall be two regular meetings of the Council in each year, one to be held during the Annual Meeting of the Association, and one on the third Tuesday in April. Regular Meetings of Council.

7. Special meetings may be called by the President or Chairman. Special Meetings of Council.

8. Due notice of every such meeting shall be given by the Secretary to each member of the Council. Notice to be given by Secretary.

9. At any meeting of the Council when business relating to the property or to the financial affairs of the Association is transacted, five members shall form a quorum; for the transaction of any other business three shall form a quorum. Constitution of quorum.

10. The Council shall make a report of the affairs of the Association at the Annual Meeting, which report shall include the report of the Secretary and also of the Board of Examiners. Annual Report of Council.

11. The Board of Examiners shall make a report to the Council at the Annual Meeting of the Association in each year. Board of Examiners to report to Council.

STANDING COMMITTEES.

12. The Standing Committees shall be as follows: Each shall be composed of not less than 5 and not more than 9 members. Standing Committees.

Committee on Land Surveying.
" " Drainage.
" " Engineering.
" " Topographical Survey.
" " Entertainment.
" " Publication.

13. Each Standing Committee appointed by the Council shall endeavor to advance the interests of the Association in that branch allotted to it. Duty of Standing Committees.

Provision for Meetings.

Meetings of any Standing Committee shall be held at the call of the Chairman, three members to form a quorum.

Standing Committees to report to Association.

Each Standing Committee shall present to the Association, or to the Council, an Annual Report on the work done by said Committee.

ORDER OF BUSINESS AT MEETINGS OF ASSOCIATION.

14. The following shall be the order of business of the Association :

Order of Business.

(1) Reading of minutes of previous meeting.
(2) Reading of correspondence.
(3) Reports and papers.
(4) Unfinished business.
(5) New business.
(6) Nomination of officers (if at the Annual General Meeting.)
(7) Adjournment.

RULES.

Procedure.

15. All motions must be in writing, and shall contain the names of the mover and seconder, and must be read from the Chair before being discussed.

Reports of Committees.

16. Reports of Committees must be in writing and signed by the Chairman thereof.

Rules of speech.

17. No member shall speak on any subject more than once, except the introducer of the subject, who shall be entitled to reply ; every member, however, shall have the right to explain himself, subject to the discretion of the Chairman.

Discussion Closed.

18. When a motion has been finally put to the meeting by the Chairman, all discussion thereon shall be closed.

Majority vote may re-open any motion.

19. Any motion may be re-opened by a majority vote of those present.

Appointment of Scrutineers.

20. The Chairman of the meeting shall appoint two scrutineers when a ballot is taken, as defined in Sec. 22 hereof.

21. Every member while speaking shall address the Chairman.

Speakers to Address the Chair.

22. All voting at any General or Annual Meeting shall be by standing vote, unless a ballot be demanded by at least two members.

Voting at General or Annual Meetings.

23. Parliamentary rules to govern in all cases not provided for in preceding sections.

Parliamentary rules to govern.

DUTIES OF OFFICERS.

24. The President, or in his absence the Vice-President, shall preside at all meetings of the Association ; in the absence of both, the meeting shall appoint a Chairman.

Presiding officer at Association meetings.

25. The Chairman shall preside at all meetings of the Council ; in his absence the meeting shall appoint a presiding officer.

Presiding Officer at Council Meetings.

26. In addition to the duties assigned to him by the said Act, the Secretary-Treasurer shall keep an accurate record of the proceedings at all meetings of both the Association and the Council in separate books, conduct all correspondence, announce all meetings, report the result of elections to the Commissioner of Crown Lands, the officers of the Association and the candidates for election, receive all fees and subscriptions and other moneys. He shall, under the direction of the Council, deposit all moneys in such bank or other financial institution as it may select. He shall pay no bills unless sanctioned by the Council and signed by the Chairman. All payments of $10 and upwards to be made by cheque, signed by the Secretary and countersigned by the President, or in his absence by the Chairman of the Council. He shall submit an account of all moneys received and paid by him under the said Act and these By-laws to the Council at the Annual General Meeting of the Association, and shall perform such other duties as may from time to time be assigned by the Council or the Association.

Duties of Secretary-Treasurer.

27. The Secretary-Treasurer shall give a bond in the usual form to the amount of $1,000, such bond to be in the custody of the President, and deposited in the bank where the funds of the Association are kept.

The Sec.-Treas. to give bond. Where they shall be deposited.

EXAMINATIONS.

Examination of candidates for apprenticeship.

28. Candidates for admission to apprenticeship are to be examined as follows, in the subjects prescribed in Rev. Stat. Ont., c. 180, s. 22 ; and no candidate shall be admitted unless he obtains at least the minimum marks set opposite each subject, and at least a total of 550.

Subject.	Max. Marks.	Min. Marks.
1. Penmanship	50	30
2. (a) Orthography (including dictation)	50	40
(b) English Grammar	50	25
3. Arithmetic (Fractions, Decimals, Square Root)	100	60
4. Logarithms and Algebra (including Equations 1st degree)	100	60
5. Euclid (Books 1, 2, 3 and 4)	100	60
6. Plane Trigonometry and Rules for Spherical ...	100	50
7. Mensuration of Superficies	50	30
8. Linear Drawing (use of ruling pen and construction of scales)	50	25
9. Canadian and General Geography	50	25
10. Canadian History	50	25

Examination of candidates for admission to practice.

29. Candidates for admission to practice are to be examined as follows in the subjects prescribed in Rev. Stat. Ont., c. 180, s. 25; and no candidate will be admitted unless he obtains at least the minimum marks set opposite each subject, and at least a total of 1,000.

Subject.	Max. Marks.	Min. Marks.
1. Geometry, including the first 6 books ol Euclid, excepting the last thirteen propositions of the fifth book	100	50
2. Algebra (simple and Quadratic Equations, Progressions and Exponents	100	50
3. Trigonometry (Plane and Spherical)	100	60
4. Mensuration of superficies and laying out and dividing land	150	75
5. Descriptions by metes and bounds	100	75
6. Use and Adjustment of Instruments for Surveying and levelling	100	70
7. Laying out of curves	50	30

	Subject	Max. Marks.	Min. Marks.
8.	Practical Astronomy, including finding of Time, Latitude, Longitude, Azimuth, Variation of Compass, and drawing Meridian Lines	150	90
9.	Survey Act	150	90
10.	Mines Act, Registry Act, Municipal Act, (so far as they relate to surveys and drainage), Ditches and Watercourses Act	100	50
11.	Levelling	50	35
12.	Principles of Evidence and drawing up Affidavits	80	40
13.	Taking of Field Notes and Preparing of Plans	100	60
14.	Geology and Mineralogy, (rudiments of)	75	40
15.	Elementary Botany and the Forest Flora of Canada	50	25

30. If a candidate for admission to practice obtains at least the total of 1,000 marks, but fails to obtain the minimum marks in, at least, two of the subjects, such candidate may at a subsequent examination be examined only in the two subjects in which he has failed.

The Board to regulate examinations.

31. The Board may make, from time to time, such regulations as it considers necessary for the proper carrying out of these examinations.

Complaints against members or any unlicensed practitioner to be filed with Secretary.

32. Any complaint against a member of the Association or against any unlicensed practitioner, shall be filed with the Secretary, who shall immediately forward the same to the Chairman.

The Chairman may call a special meeting.

If the matter complained of is of a serious and pressing nature, the Chairman may, at his discretion, call a special meeting of the Council for the purpose of hearing said complaint; if not so acted on, the complaint shall be heard at the next regular meeting of the Council.

Procedure where the delinquent is a member.

In the case of a member of the Association, the Council shall take action as defined in the said Act.

Procedure where the delinquent is an unlicensed practitioner.

In the case of any unlicensed practitioner, the Council, if satisfied as to the justice of the charge, shall name a prosecutor and direct him as to his action in the conduct of the case, and shall allot such portion of the penalties, or authorize the payment of such fees as it may deem expedient.

The Council has power to pass By-laws.

33. The Council shall have power to pass any By-law which it deems expedient for the good of the Association, and such By-law shall have the same force until the next Annual Meeting, as if it had been passed by the Association. Such By-law must be reported to the Association at the next Annual Meeting, and the action taken thereon. All members of the Association shall be notified by the Secretary of the passing of such By-law by the Council.

34. Grants exemption from dues, under 55 V., c. 34, s. 10 (4), to Henry Strange, Milton C. Schofield, William Robinson, Joseph Kirk, Charles Fraser, Joseph M. O. Cromwell, H. O. Wood, F. H. Lynch-Staunton, and E. C. Caddy.

35. The annual fees to this Association paid by candidates admitted to practice at the session of the Board in February in any year shall cover the annual dues for the remainder of the then current Association year, and for the Association year immediately following the same.

36. Grants exemption from dues under 55 V., c. 34, s. 10 (4) to Thomas Coltrin Keefer, Nathaniel Edward Low, Thomas Cheesman, James McCallum and Thomas W. Walsh.

37. Grants exemption from dues under 55 V., c. 34, s. 10 (4), to Royal Wilkinson Hermon.

38. Reduced the number of minimum marks in the subject of "Levelling," (Obsolete).

39. "Whereas any registered surveyor desiring to give up practice can have his name removed from the registered list of practitioners at any time, upon giving written notice of such desire, and whereas it is desirable that such surveyors may contribute papers and secure the reports of the transactions of this Association and exchanges, therefore this Council hereby exacts that such surveyors shall have the aforesaid privileges upon the payment of an annual fee of two dollars, and their names shall be printed in the list of members in the annual report of Association and properly marked."

40. Grants exemption from dues under 55 V., c. 34, 3 10 (4), to Tom S. Rubidge and James A. Gibson.

41. Grants exemption from dues, under 55 V., c. 34, s. 10 (4), to Charles J. Wheelock, Thomas Weatherald, Michael Deane, John Smith Brown, and William Edward Yarnold.

42. Grants exemption from dues, under 55 V., c. 34, s. 10 (4), to Alexander Davidson.

43. Grants exemption from dues, under 55 V., c. 34, s. 10 (4), to Charles Unwin, Wm. R. Rombough and Henry Winter.

44. Changes the name of "Committee on Topographical Surveying" to "Committee on Topographical Survey."

45. Whereas any registered surveyor desiring to give up practice can have his name removed from the list of practitioners upon giving written notice of such desire, and whereas it is desirable that such surveyors may contribute papers and secure the reports of the transactions of this Association, therefore it is hereby enacted that such surveyors shall have the aforesaid privileges upon the payment of an annual fee of one dollar, and their names shall be printed in the list of members in the Annual Report of the Association and properly marked.

46. Grants exemption from dues, under 55 V., c. 34, s. 10 (4), to George Alexander Stewart.

47. Whereas it has been proven to the satisfaction of the Council that Harry John Browne was granted a commission as a Provincial Land Surveyor on the 16th July, 1872, and that the said Harry John Browne has been for several years a great sufferer from illness and is practically unable to practice his profession, it is therefore enacted that the said Harry John Browne is hereby granted exemption from dues under the authority of sub-section 4 of section 42, chapter 180, Revised Statutes of Ontario, 1897. (Passed 25th Feb., 1908. Ratified 25th Feb., 1909.)

RULES AND REGULATIONS
OF THE
Board of Examiners for Ontario Land Surveyors.

Adopted by the Board of Examiners.

1. The examination sittings shall commence each day at 9.30 a.m., continue until 12.30 p.m., recommence at 1.30 p.m., and continue until 4.30 p.m. day by day until completed, subject to the direction of the Board.

2. All the papers will be collected at the close of each sitting and candidates will not be permitted to write on any question on such papers at any future sitting.

3. Any candidate obtaining assistance during the hours of examination, by copying the papers of another candidate or otherwise, will at once be dismissed, and any candidate who shall permit such copying or give such assistance will be considered equally guilty and treated similarly.

4. The candidate shall sign each sheet and mark on the top the number thereof and of the subject or group of subjects. He shall mark in the margin the number opposite each question, and shall attach the several sheets, together with the examination paper, to the cover provided for that purpose.

5. The candidate shall not write on one line more than one step in geometrical or algebraic work. A single step may cover several lines, but two or more should in no instance be put on the same line. They should be written thus :

Because $A = B$

And $B = C$

Therefore $A = C$

6. No other person than the examiners, the secretary and the candidates shall be admitted into

the examination room unless by permission of the Board.

7. No books or diagrams of any kind, except those allowed by the Board, shall be brought into the examination room.

8. Candidates are to present themselves punctually at the hours appointed for the commencement of the examinations, and no candidates will be allowed to enter the examination room later than five minutes after that time, nor will any candidate be permitted to leave the room during a sitting, but so soon as he has finished his papers he may hand them to the secretary, after which he will not be allowed to re-enter until the next sitting.

9. A candidate rejected by the Board shall not be entitled to a new examination before the next regular meeting of the Board.

10. Each candidate for "Admission to Practice" shall bring with him an instrument suitable for taking the necessary observations required in Sec. (8), By-law 29, which he shall submit to the Board for their examination and approval, and he shall also submit a plan and field notes of a survey, both made by himself, which may be filed with his papers.

11. Each candidate for Admission to Apprenticeship shall bring with him a ruling pen and scale.

FEES.

12. The following fees shall be paid to the Secretary-Treasurer for the use of the Association :

(1) By every person duly authorized to practise as a land surveyor under the provisions of this Act, on applying for registration under this Act, the sum of $1.

(2) By each member of this Association, an annual membership fee of $4.

(3) By each apprentice at the transmitting to the Secretary the indenture or articles of such apprenticeship, $10 ; 62 Vic. 2, c. 11, s. 18.

(4) By each candidate for the preliminary examination on presenting himself for examination, $10.

(5) By each candidate for examination, with his notice thereof, for receiving and entering such notice, $1.

(6) By each applicant obtaining a certificate, as fee thereon, $2.

(7) By each applicant receiving a certificate to practise, as an admission fee, $30.

(8) By each apprentice with each transfer of articles as a fee for registering the same, $2.

(9) By each applicant receiving a certificate to practise, being the fee for official notice in the Ontario Gazette, $1. 55 V., c. 34, s. 7; 69 V., c. 27, s. 26.

MEMBERS

1909

The names of those members granted exemption by By-laws ratified by the Association are marked *.

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Abrey, George Spencer, Toronto Junction	6th April, 1906
Allan, John Richard, Renfrew Grad. S.P.S.	6th Nov., 1894
Ardagh, Arthur Gowan, Barrie	18th Feb., 1908
Aylsworth, Charles Fraser, Jr., Madoc D.L.S.	8th Jan., 1886
Aylesworth, John Sidney, Sharp's Corners, Ont. D.L.S.	9th Jan., 1871
Aylsworth, William Robert, Belleville, P.O. Box 2 D.L.S.	8th Nov., 1861
Baird, Alexander, Leamington C.E.	7th July, 1877
Baker, Mason Herman, St. Thomas D.L.S.	16th Feb., 1909
Barrow, Ernest George, Hamilton D.L.S., Mem. Can. Soc. C.E., City Engineer.	4th Oct., 1877
Bazett, Edward, Huntsville D.L.S.	8th July, 1881
Beatty, David, Parry Sound D.L.S.	12th July, 1869
Beatty, Herbert John, Eganville Grad. S.P.S.	8th Nov., 1893
Beatty, Walter, Delta D.L.S. M.P.P.	19th July, 1858
Bell, Andrew, Almonte B.A., Mem. Am. Soc. C.E., Mem. Can. Soc. C.E., Mem. Ont. A.A., D.L.S.C.E.	14th Oct., 1901
Bell, James Anthony, St. Thomas D.L.S., Co. Engineer, Elgin; City Engineer, St. Thomas.	11th Oct., 1875
Bigger, Charles Albert, Ottawa, 145 Gloucester St. D.L.S., A.M. Can. Soc. C.E., B.C.S., Astronomer, Dept. Interior.	6th Jan., 1882

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Bingham, Edwin Ralph, Fort William D.L.S.	17th Feb., 1906
Blake, Frank Lever, Toronto, Meteorological Office D.L.S.	13th April, 1875
Blair, William John, New Liskeard Grad. S.P.S.	13th Feb., 1904
Bolton, Ellsworth Doan, Listowel B.A.Sc. (McGill).	7th Nov., 1899
BOLTON LEWIS, Listowel President Association of O.L.S., D.L.S.	9th July, 1864
Booth, Charles Edward Stewart, Not known D.L.S.	6th April, 1882
Boswell, Elias John, C.P.R. Construction Dept. Offices, Winnipeg, 135 Carlton st. Grad. S.P.S., D.L.S.	7th Nov., 1896
Bowman, Clemens Dersteine, West Montrose	10th July, 1879
Bowman, Herbert Joseph, Berlin D.L.S., Grad. S.P.S., Treasurer County Waterloo, Assoc. Mem. Can. Soc. C. E.	7th Jan., 1887
Bowman, Edgar Peterson, West Montrose	17th April, 1907
Bray, Lennox Thompson, Amherstburg D.L.S.	17th Feb., 1902
Bray, Harry Freeman, Oakville D.L.S.	10th July, 1882
Bray, Samuel, Ottawa, Dept. of Indian Affairs D.L.S., C.E.	6th Jan., 1877
Brian, Michael Edward, Windsor City Hall B.A. Sc.	17th Feb., 1906
Brown, David Benjamin, Cornwall D.L.S.	23rd Feb., 1904
Brown, George Laing, Morrisburg Grad. S.P.S.	19th Feb., 1898
*Brown, John Smith (address not known) D.L.S.	8th July, 1852
*Browne, Harry John, Toronto, 203 Albany Ave. C.E.	6th July, 1872
Browne, William Albert, Toronto, 18 Toronto st.	10th April, 1876
Burd, James Henry, Parry Sound Grad. S.P.S.	2nd Oct., 1905

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Burgess, Edward LeRoy, Ottawa, 21 First Ave.	6th May, 1905
Burt, Frederick Percy, New York, N.Y. President "The American Architect," Times Bldg., New York.	8th July, 1885
Burwash, Nathaniel Alfred, White Horse, Y.T. D.L.S., Grad. S.P.S.	6th May, 1905
Bush, Clayton Elgin, Toronto Grad. S.P.S.	15th May, 1908
Butler, Matthew Joseph, Deputy Minister of Railways and Canals, Ottawa C.E., M.I.C.E., Mem. Am. Soc. C.E., Mem. Can. Soc. C.E.	11th Jan., 1878
Byrne, Thomas, Sault Ste. Marie D.L.S.	15th July, 1862
Caddy, John St. Vincent, Ottawa, 327 Laurier Ave D.L.S.	6th Oct., 1866
Cameron, Alfred John, Peterborough	9th April, 1889
Campbell, Archibald William, Toronto, Parliament Buildings C.E., Deputy Minister of Public Works.	10th April, 1885
Carre, Henry, 276 Albert st., Belleville, Box 203 M.O. & Georgian Bay Canal, B.A. and C.E. (Trin. Coll., Dublin), D.L.S	8th Nov., 1861
*Carroll, Cyrus, Prince Albert, Sask. Mem. Can. Soc. C.E., D.L.S. District Surveyor and Engineer.	10th Jan., 1860
Casgrain, Joseph Philippe Bâby, Montreal D. L. S., P. L. S., (Que.) C. E., Assoc. Mem. Can. Soc. C. E. Chief Eng M. & P. J. Ry., Senator.	5th Jan., 1887
Cavana, Allan George, Orillia D.L.S.	8th July, 1876
Chase, Albert Victor, Orillia, Ont. Grad. S.P.S.	21st April, 1909
Chipman, Willis, Toronto, 103 Bay st. D.L.S., B.A.Sc. (McGill), Mem. Am. Soc. C.E., Mem. Can. Soc. C.E.	4th Oct., 1881
Christie, Uriah Wesley, Chesley	1st March, 1906
Clarke, Fred Fieldhouse, 22 Gibson Ave., Toronto, Ont. Grad. S.P.S.	31st March, 1905
Clarke, Leonard Oswald, North Bay	14th Feb., 1903
Code, Abraham Silas, Alvinston	14th April, 1896
Code, Samuel Barber, Smith's Falls	1st May, 1905

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Code, Thomas George, Box 330, Cobalt	17th April, 1907
Code, Richard Stanley, Box 330, Cobalt	17th April, 1907
Cotton, Arthur Frederick, North Bay	11th July, 1874
Cozens, Joseph, Sault Ste. Marie D.L.S.	7th July, 1875
Crerar, Samuel Rutherford, Toronto, School of Science D.L.S., B.A.Sc., Toronto.	1st March, 1906
Dalton, John Joseph, Weston, Ont D.T.S.	11th Jan., 1878
*Davidson, Alexander, Arkona D.L.S.	11th Oct., 1858
Davis, William Mahlon, Berlin Grad. R.M. Coll. (Kingston), Town Engineer.	11th April, 1885
Deacon, Thomas Russ, Winnipeg Grad. S.P.S.	12th Nov., 1892
Deans, William James, Brandon, Man D.L.S.	11th July, 1884
DeMorest, Richard Watson, Sudbury M.E.	9th April, 1889
Dickson, James, Fenelon Falls D.L.S.	6th April, 1867
Dixon, Howard, Can. Nor. Ry., Winnipeg Grad. S.P.S.	14th Feb., 1903
Dobie, James Samuel, Thessalon B.A.Sc. (Toronto Univ.), D.L.S.	21st Feb., 1898
*Doupe, Joseph, Winnipeg, Man., 169 Edmonton st. C.E. (McGill), D.L.S., P.L.S. (Man.), P.L.S. (B.C.).	13th Jan., 1863
Dunn, Thomas Hamilton, Winchester. Grad. S.P.S.	14th May, 1906
Eagleson, Francis Merwin, Winchester, Ont. Grad. S.P.S.	11th May, 1909
Empey, John Morgan, Ottawa D.L.S.	16th Feb., 1907
Esten, Henry Lionel, Toronto, 157 Bay st.	7th Jan., 1887
Evans, John Dunlop, Trenton D.L.S., Mem. Can. Soc. C.E., Chief Eng. Cent. Ont. Ry.	8th July, 1864
Fair, John, Brantford	13th April, 1875
Fairbairn, Richard Purdom, Toronto, 452 Markham st. Surveyor for Dept. of Pub. Works, Ontario.	7th Oct., 1876

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Fairchild, Charles Court, Brantford Grad. S.P.S., D.L.S.	9th April, 1894
Fairchild, William Howard, Brantford	17th Feb., 1900
Farley, Sidney Edward, 362 Rideau St., Ottawa P.L.S., Que.	21st April, 1909
Farncomb, Alfred Ernest, Red Deer, Alberta D.L.S.	9th April, 1895
Farncomb, Frederick William, London, 213 Dundas st.	6th Nov., 1889
Fawcett, Thomas, Niagara Falls Dom. Topographical Surveyor.	6th Jan., 1881
Fitton, Charles Edward, Orillia, Box 142 D.L.S.	10th April, 1879
Fitzgerald, James William, Peterborough	13th Feb., 1904
Flater, Frederick William, Chatham	9th April, 1888
Francis, John James, Sarnia P.O., Box 304 D.L.S.	16th Oct., 1861
Fuce, Edward Oliver, Galt.	17th Feb., 1906
Fullerton, Charles Herbert, New Liskeard D.L.S., Grad. S.P.S.	7th May, 1906
Galbraith, William, Bracebridge D.L.S.	4th April, 1883
Gamble, Killaly, Toronto, 31 Sussex Court D.L.S., P.L.S. (Man.), Sec. Assoc. O.L.S., Captain R.A. (Ret').	6th April, 1888
Gardiner, Edward, St. Catharines D.L.S.	6th Jan., 1866
Gaviller, Maurice, Collingwood, Box 164 C.E. (McGill), D.L.S.	6th Jan., 1866
Gibson, Peter Silas, Willowdale C.E.M.S. (Mich. Univ.), D.L.S., Mem. Can. Soc. C.E.	19th July, 1858
Gibson, Wilbert Silas, Willowdale	21st Feb., 1898
Gillon, Douglas John, Fort Frances Grad. R.I.E. Coll.	9th Nov., 1895
Graydon, Aquila Ormsby, City Engineer London	8th July, 1880
Green, Thomas Daniel, Prescott, Ont. D.L.S.	7th Jan., 1885
Greenlees, Alex'r Hunter, 866 Wellington St., N., London, Ont. Grad. S.P.S.	21st April, 1909

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Griffin, Albert Dyke, B.A., Galt	11th Nov., 1890
Halford, Abraham Joseph Bartholomew, Essex Centre	
Hanes, George Samuel, North Vancouver, B.C. City Engineer. Grad. S.P.S.	6th May, 1905
Hart, Milner, Toronto, 103 Bay st. D.L.S.	11th July, 1863
Heaman, John Andrew, G. T. P. Ry., Winnipeg	16th Nov., 1896
Henry, Frederick, London, Albion Bldg.	7th April, 1887
Holcroft, Herbert Spencer, 182 Bloor St., W. Toronto D.L.S., B.A.Sc. (Toronto Univ.).	17th Feb., 1902
Hopkins, Marshall Willard, Edmonton, Alta. D.L.S., B.A. Sc. (McGill), Assoc. Mem. Can. Soc. C.E.	13th Nov., 1893
Hutcheon, James, Guelph, 48 Glasgow St. Grad. S.P.S.	10th Nov., 1891
Jackson, John Herbert, Niagara Falls	16th Feb., 1901
James, Darrell Denman, Toronto, 227 George st. D.L.S. B.A., B.A.Sc. (Toronto Univ.).	3rd Nov., 1891
James, Silas, Toronto, 227 George st. D.L.S.	19th July, 1858
Johnston, Herbert, Berlin Grad. S.P.S.	21st Feb., 1905
Jones, Charles Albert, Petrolea D.L.S.	8th April, 1881
Jones, George Samuel, Smith's Falls, Grad. S.P.S.	21st April, 1909
Jones, John Henry, Sarnia, Box 194 D.L.S.	10th Oct., 1886
Jones, Thomas Henry, Brantford B.A.Sc. (McGill), D.L.S., City Engineer.	10th Oct., 1878
*Keefer, Thomas Coltrin, Rockliffe Manor House, Ottawa D.L.S., C.E.	14th Aug., 1840
Kirkpatrick, George Brownly, Toronto, Dept. of Crown Lands D.L.S., Director of Surveys.	13th April, 1863
Laird, James Stewart, Essex D.L.S.	6th April, 1867
Laird, Robert, Haileybury Grad. S.P.S.	11th Nov., 1887
Lang, John Leiper, Toronto, 20 Leopold St.	2nd May, 1908

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD
Lawe, Henry, Ottawa	6th Oct., 1860
Le May, Tracy Deavin, Toronto	1st May, 1909
Lewis, John Bower, Ottawa, Brunswick House D.L.S., P.L.S. (Quebec), C.E.	4th Oct., 1883
Lougheed, Aaron, Port Arthur D.L.S.	12th Nov., 1888
Low, Edward Hamilton, Sudbury Grad. R.M.C. (Kingston).	17th Feb., 1902
*Low, Nathaniel Edward, Sarnia D.L.S.	11th July, 1856
Lumsden, Hugh David, Ottawa, 152 Argyle Ave., C.E., D.L.S., M.I.C.E., Mem. Can. Soc. C.E., Chief Eng. Trans. Cont. Ry.	4th Jan., 1866
MacKay, James John, Hamilton	25th Feb., 1899
MacKenzie, William, Sarnia Grad. R.M.C. (Kingston).	11th April, 1896
MacKenzie, William Lyon (not known) C.E.	7th April, 1887
McAuslan, Herbert James, North Bay D.L.S., B.A.Sc. (Toronto).	19th Feb., 1906
McCaw, Robert Daniel, Welland D.L.S.	16th Feb., 1907
McColl, Charles Ross, Walkerville, Grad. S.P.S.	4th May, 1909
McCubbin, George Albert, St. Thomas, City Engineer's Office Assistant City Engineer.	9th Nov., 1895
McDowall, Robert, Owen Sound Grad. S.P.S., Town Engineer.	11th Nov., 1890
McEvoy, Henry Robinson, St. Mary's D.L.S.	10th July, 1875
McFadden, Moses, Neepawa, Man. D.L.S., P.L.S. (Man.).	13th April, 1858
McFarlen, George Walter, Toronto, City Hall, City Engineer's Office Grad. S.P.S.	11th Nov. 1858
McGrandle, Hugh, Huntsville D.L.S.	5th Jan., 1883
McKay, Owen, Walkerville, Ont., Box 324 M.C.S.C.E., Grad. S.P.S.	7th Jan., 1887
McKenna, John Joseph, Dublin D.L.S.	9th July, 1860

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
McLean, James Keachie, Ottawa, Dept. Indian Affairs D.L.S.	8th April, 1876
McLean, William Arthur, Toronto, Parliament Buildings A. M. Can. Soc. C. E. Engineer of Highways.	21st Feb., 1898
McLennan, Murdoch John, Williamstown B.A.Sc. (McGill), D.L.S.	13th Nov., 1893
McMullen, William Ernest, Frederickton, N.B. Dept. Crown Lands	11th Nov., 1892
McNab, John Duncan (not known)	9th Oct., 1879
McNaughton, Alexander Lorne, Cornwall	May, 1905
McNaughton, Finlay Donald, Cornwall	25th Feb., 1899
McPherson, Charles Wilfrid, Dawson, N.W.T. Director of Surveys, Yukon D.L.S., Director of Surveys, Yukon.	21st Feb., 1899
McPhillips, George, Winnipeg, Man D.L.S., P.L.S. (Man.).	9th July, 1885
Manigault, William Mazyck, Strathroy, P.O. Box 300	8th July, 1876
Miller, Frederick Fraser, Napanee D.L.S.	8th Jan., 1885
Montgomery, Royal Harp, Prince Albert, Sask. D.L.S.	6th May, 1905
Moore, John MacKenzie, London, Albion Building	9th Oct., 1879
Moore, John Harrison, Smith's Falls Grad. S.P.S.	11th Nov., 1889
Moore, William James, Pembroke	18th Feb., 1908
Morris, James Lewis, Pembroke D.L.S., C.E. (Toronto Univ.).	7th July, 1886
Mountain, George Alphonse, Ottawa Mem. Can. Soc. C.E., D.L.S., P.L.S. (Que.), Engineer for Railway Commission.	9th Jan., 1884
Murdoch, William, Bowmanville D.L.S., C.E.	10th Jan., 1860
Murphy, Charles Joseph, Toronto, 157 Bay st.	6th Oct., 1886
Nash, Thomas Webb, Kingston D.L.S.	7th April, 1854

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Neelands, Ernest Wesley, New Liskeard, Ont. Grad. S.P.S.	16th Feb., 1909
Newman, John James, Windsor	21st Feb., 1898
Newman, William, Windsor, 57 Sandwich st. w. Grad. S.P.S.	12th Nov., 1892
Niven, Alexander, Haliburton D.L.S.	8th July, 1859
Ogilvie, William, 27 Nepean st., Ottawa D.L.S.	12th July, 1869
O'Hara, Walter Francis, 236 Waverly St., Ottawa D.L.S.	14th April, 1892
Ord, Lewis Redmond, Hamilton, c.o. Traders Bank	8th January, 1885
Parsons, Johnston Lindsey Rowlett, Regina, Sask., Box 1004 D.L.S., Grad. S.P.S.	6th May, 1905
Patten, Thaddeus James, Little Current D.L.S.	5th Jan., 1883
Patterson, Frank Elliott, Sudbury Ont. Grad. S.P.S.	21st April, 1909
Paulin, Frederick William, Toronto Grad. S.P.S., Toronto.	11th May, 1908
Pierce, John Wesley, Kingston	20th Feb., 1909
Pinhey, Charles Herbert, Ottawa, 110 Wellington st. D.L.S., Grad. S.P.S., Assoc. Mem. Can. Soc. C.E.	12th Nov., 1888
Proudfoot, Hume Blake, Saskatoon B.A.Sc. (Toronto Univ.).	6th Jan., 1882
Rainboth, Edward Joseph, Ottawa D.L.S.	11th Nov., 1887
Rainboth, George Charles, Aylmer, P.Q. D.L.S., P.L.S. (Que.).	11th July, 1868
Reinhardt, Carl, Box 303, Cobalt B.A.Sc., McGill.	25th Feb., 1899
Roberts, Vaughan Maurice, St. Catharines D.L.S.	5th April, 1887
Robertson, James, Glencoe Grad. S.P.S.	11th July, 1885
Roger, John, Mitchell Grad. S.P.S.	10th Nov., 1888

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Rogers, Richard Birdsall, Peterborough B.A.Sc. (McGill), D.L.S.	9th Jan., 1879
*Rombough, William R., Toronto, 254 Borden st D.L.S.	14th Nov., 1848
Rorke, Louis Valentine, Toronto, 199 Madison Ave Grad. S.P.S., D.L.S.	14th April, 1890
Ross, George, Welland A.M. Can. Soc. C.E., B.A.Sc. (McGill), D.L.S.	10th July, 1879
Ross, Kenneth George, Toronto, Ont. Grad. S.P.S.	15th May, 1909
Routly, Herbert Thomas, Haileybury Grad. S.P.S.	1st May, 1907
Russell, Alexander Lord, Port Arthur D.L.S., P.L.S. (Que.).	16th April, 1873
Rutherford, T. N.	18th May, 1906
*Scane, Thomas, Ridgetown D.L.S.	7th Jan., 1865
*Schofield, Milton C., Guelph, Ont. D.L.S.	28th Sept., 1843
Seager, Edmund, Kenora D.L.S.	8th July, 1861
Selby, Henry Walter, 125 Howland ave., Toronto D.L.S.	8th Jan., 1876
Sewell, Henry DeQuincy, Toronto, 34 Yonge st D.L.S., A.M.I.C.E.	9th July, 1885
Seymour, Horace Llewellyn, Edmonton, Alta. D.L.S.	2nd May, 1908
Shaw, John Henry, North Bay Grad. S.P.S.	17th Feb., 1906
Silvester, George Ernest, Sudbury Grad. S.P.S.	12th Nov., 1892
Sing, Josiah Gershom, Toronto, Room 71, Confederation Life Building D.L.S., C.E., Public Works Dept.	9th Jan., 1879
Smith, Angus, Regina Grad. S.P.S., City Engineer.	14th April, 1896
Smith, George, Box 25, Lindsay Engineer for Co. Victoria and four Townships.	7th April, 1881
Smith, James Herbert, New Liskeard	27th Dec., 1904
Smith, Charles Campbell, Ottawa D.L.S.	16th Feb., 1907

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Smith, Walter, Lindsay	16th Feb., 1907
Speight, Thomas Bailey, Toronto, 703 Temple Building D.L.S.	6th Jan., 1882
Stacey, Albert George, Victoria, B.C. D.L.S.	30th March, 1908
Steele, David Layton, Meaford.	May, 1905
*Stewart, George Alexander, D.L.S.	8th July, 1852
Stewart, John, (address not known) D.L.S.	11th Nov., 1887
Stewart, Walter Edgar, Aylmer	12th April, 1892
Stull, William Walter, Sudbury B.A.Sc. (Toronto Univ.).	17th Feb., 1900
Summers, Gordon Foster, Winchester Grad. S.P.S., Toronto.	11th May, 1908
Sutcliffe, Homer Wilson, Forest, Ont Grad. S.P.S., Toronto.	11th May, 1908
Taylor, William Verner, Montreal, Sovereign Life Building Grad. S.P.S.	7th Nov., 1896
Tench, William Eastwood, Niagara Falls	11th Jan., 1878
Townsend, David Thomas, Woodstock. D.L.S., B.A.Sc., Toronto.	17th Feb., 1906
Traynor, Isaac, Dundalk D.L.S.	16th April, 1873
Turnbull, Thomas, Winnipeg, Man., C. N. R. Eng. Office D.L.S., C.E. (Toronto Univ.).	6th July, 1878
Tyrrell, James Williams, Hamilton, Ont. Prov. & Loan Chambers, 7 Hughson St. S. C.E. (Toronto Univ.), D.L.S., Co. Eng. for Wentworth.	8th April, 1885
*Unwin, Charles, Toronto, 126 Seaton st. D.L.S., City Surveyor.	12th April, 1852
Ure, Frederick John, Woodstock D.L.S.	7th April, 1887
Van Nostrand, Arthur J., Toronto, 703 Temple Building D.L.S.	30th Oct., 1882
Waddell, William Henry, Hamilton. D.L.S.	May, 1905

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Wadsworth, Vernon Bayley, Toronto, 103 Bay st. D.L.S.	9th April, 1864
Walker, Alfred Paverley, Toronto, Room 508, Union Station, C. P. Ry., Eng. Office D.L.S., Mem. Can. Soc. C.E.	6th Jan., 1882
Wallace, James Nevin, Calgary, Alta D.L.S., B.A., B.E. (Trin. Coll., Dublin).	21st Feb., 1898
Ward, Archeson Thomas, Toronto, 703 Temple Building	10th April, 1897
Warren, James, Walkerton, P.O. Box 190 D.L.S.	7th Oct., 1864
Watson, John McCormack, Orillia, P.O. Box 224	13th April, 1892
Wells, Arthur Frederick, Sandwich.	17th Feb., 1906
*Wetherald, Thomas, 210 Delatre St., Woodstock D.L.S., C.E.	12th Jan., 1856
Weekes, Abel Seneca, Glencoe D.L.S.	12th April, 1890
Weekes, Melville Bell, Brantford B.A.Sc. (Toronto Univ.), D.L.S.	17th Feb., 1900
West, Robert Francis, Orangeville	7th April, 1881
Wheelock, Charles Richard, Orangeville Treasurer County of Dufferin.	7th Jan., 1886
Whitson, James Francis, Toronto, Dept. of Lands, Forests and Mines	9th Jan., 1886
Wiggins, Thos. Henry, Finch, Ont Grad. S.P.S.	10th Nov. 1891
Wilde, John Absalom, Sault Ste. Marie,	9th April, 1893
Wilkie, Edward Thomson, Carleton Place D.L.S.	11th April, 1891
Wilkins, Frederick William, Norwood, Ont D.T.S.	6th Jan., 1877
Williams, David, Port Arthur. D.L.S.	9th April, 1864
*Winter, Henry, Thornyhurst D.L.S., C.E.	11th July, 1853
*Wood, Henry O., Billings Bridge	10th Oct., 1855
*Yarnold, William Edward, Port Perry, P.O. Box 44 D.L.S.	7th April, 1854

REGISTERED AND WITHDRAWN FROM PRACTICE

The names of those who have become "Associates" under By-law No. 39 are marked *; and under By-law No. 45 are marked †.

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Anderson, John Drummond, Trail, B.C.	13th April, 1892
Anderson, William Beaumont, Ottawa, 178 Cartier st. Grad. R.M.C., B.A.Sc. (McGill), M. Can. Soc. C.E., D.L.S.	14th Feb., 1903
Apsey, John Fletcher, Cumberland, Md. Grad. S.P.S.	6th Jan., 1886
Aylsworth, Charles Fraser, Sr., Madoc D.L.S.	2nd April, 1861
Bowman, Arthur Meyer, Mahan, Beaver Co., Pa. Grad. S.P.S., Staff of U. S. Engineers.	11th Nov., 1887
Bowman, Franklin Meyer, Bellevue, Allegheny Co., Pa. Grad. S.P.S., Engineer Structural Iron Works.	11th April, 1892
Brady, James, Victoria, B.C., P.O. Box 815 M.E.	15th July, 1862
Burnet, Hugh, Victoria, B.C. D.L.S., P.L.S. (B.C.).	5th April, 1887
Cambie, Henry John, Vancouver, B.C. D.L.S., P.L.S. (B.C.).	8th July, 1861
Carbert, J. Alfred, Medicine Hat, Assa. Dist. Eng. and Surveyor.	7th April, 1876
Carpenter, Henry Stanley, Collingwood D.L.S., B.A.Sc., Toronto.	25th Feb., 1899
Chalmers, John, Edmonton, Alta. Structural Engineer, Dept. Pub. Works.	11th April, 1896
*Charlesworth, Lionel Clare, Edmonton, Alta. Grad. S.P.S., Director of Surveys, Saskatchewan, D.L.S.	14th April, 1896

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Coleman, Richard Herbert, Toronto, Can. Co. Offices, Imperial Bank Chambers	6th Oct., 1877
Davis, Allan Ross, 242 Spence St., Winnipeg, Man. B. A. Sc. (McGill).	8th Jan., 1886
Drewry, William Stewart, Ottawa, Dept. of the Interior D.L.S	5th April, 1883
Ducker, William A., Winnipeg, Man. D.L.S., P.L.S. (Man.), Swamp Lands Comm'r.	6th April, 1882
Edwards, George, Thurso, P.Q. D.L.S.	6th Jan., 1866
*Ellis, Henry Disney, Kuching, Sarawak, Borneo D.L.S., Commissioner of Pub. Works and Surveys.	7th April, 1877
Ford, Wm. Butterton, Wabana, Nfld.	21st Feb., 1898
Galbraith, John, Toronto, School of Prac. Science M.A., D.L.S., Prof. Engineering S.P.S.	13th April, 1875
Gibbons, James, Ottawa, Dept. of the Int. Grad. S.P.S., Dominion Topographical Surveyor.	15th April, 1890
Gibson, George, St. Catharines D.L.S.	10th April, 1860
Gibson, Harold Holmes, Jackson, Kentucky	8th Sept., 1891
*Harris, John Walter, Winnipeg, Man. P.L.S. (Man.), D.L.S., Assessment Com.	6th Oct., 1866
*Harvey, Thomas Alexander, 239 Vernon ave., Long Island, N. Y. City	13th Nov., 1893
Henderson, Eder Eli, Henderson P.O., Maine Grad. S.P.S.	7th April, 1887
Hermon, Ernest Bolton, Vancouver, B.C. P.L.S. (B.C.), D.L.S.	7th Oct., 1885
Hobson, Joseph, Hamilton, 343 Bay St. S.	3rd Oct., 1855
Innes, William Livingstone, Simcoe C.E. (Toronto Univ.).	14th April, 1892
Jephson, Richard Jermy, Winnipeg, Man. P.L.S. (B.C.), D.L.S.	7th April, 1877
Johnson, Sydney Munnings, Greenwood, B.C.	9th Nov., 1895

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Johnston, Robert Thornton, 15 Union Hall St., Jamaica, New York City	9th April, 1889
Kennedy, James Henry, Keremeos, B.C. C. E. (Toronto Univ.), Chief Engineer V. V. & E. R. & N. Co.	7th April, 1887
*Kippax, Hargreaves, Huron, South Dakota. C.E. (Toronto Univ.), Assistant to Surveyor-General.	7th July, 1877
Kirk, John Albert, Revelstoke, B.C. D.L.S., P.L.S. (B.C.).	6th July, 1877
Klotz, Otto, 437 Albert st., Ottawa Dom. Top. Surveyor, C.E. (Mich. Univ.), LL.D.	6th Jan., 1867
Lane, Andrew, Sparrow's Point, Md. Grad. S.P.S., Draftsman Maryland Steel Co.	4th April, 1895
Lendrum, Robert Watt, Strathcona, Alta. D.L.S.	8th Jan., 1874
Livingstone, Thomas Chisholm, (address not known) D.L.S.	10th Jan., 1859
MacLeod, Henry Augustus F., Ottawa, 340 Cooper st. D.L.S., C.E.	11th Oct., 1856
MacPherson, Duncan, Montreal Grad. R.M.C., M.I.C.E., Mem. Can. Soc. C.E., Div. Eng. East Div. C.P.R., D.L.S.	9th Jan., 1884
McCulloch, Andrew, Lake Nelson, B.C. Grad. S.P.S., Assoc. Mem. Can. Soc. C.E., City Engineer.	
McLennan, Roderick, Toronto	20th Jan., 1846
Magrath, Charles Alexander, Lethbridge, Alta. B.A.Sc. (McGill), D.L.S., P.L.S. (B.C.).	1st Nov., 1881
Marshall, James, Blyth. D.L.S.	6th Oct., 1866
Meadows, William Walter, Windsor D.L.S., Grad. S.P.S.	21st Feb., 1898
Miles, Charles Falconer, 268 Triangle st., Buffalo, N.Y.	13th Jan., 1862
Moore, Thos. Alexander, London South	12th Nov., 1892
Morris, Alfred Edmund, Montreal, Que.,	10th April, 1879

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Munro, John Vicar, New York, N.Y., 359 West 31st st.	9th April, 1895
†Paterson, James Allison. C.E., Mem. Can. Soc. C.E.	5th April, 1878
Pearce, William, Calgary, Alta D.L.S., P.L.S. (B.C.), Asst. B.C. Land Commissioner for C.P.R.	12th Oct., 1872
Peterson, Peter Alexander, Montreal, P.Q. D.L.S., C.E. (Toronto Univ.)	16th July, 1863
Ponton, Archibald William, Macleod, Alta D.L.S.	9th April, 1880
Purvis, Frank, Mesa City, Arizona	7th April, 1875
Reid, John Lestock, Prince Albert, Sask D.L.S.	8th April, 1870
Reiffenstein, James Henry, Ottawa, Dept. of the Interior D.L.S.	16th April, 1873
Reilly, William Robinson, London, 361 Simcoe st. D.L.S., P.L.S. (Man.).	7th April, 1881
Reynolds, Samuel Henry, Winnipeg	17th July, 1880
Ritchie, Nelson Thomas, Kipiegan, Man P.L.S. (Man.)	9th Nov., 1888
Robinson, Franklin Joseph, Regina Grad. S.P.S., D.L.S., Dep. Min. Pub. Works.	21st Feb., 1898
*Ross, Joseph Edmund, New Westminster, B.C. D.L.S., P.L.S. (B.C.).	11th Nov., 1890
Sanderson, Daniel Leavens, Coral, Mich	4th Oct., 1882
Saunders, Bryce Johnston, Edmonton, Alta B.A.Sc. (McGill), D.L.S.	7th Jan., 1885
Schwitzer, John Edward, C. P. Ry. B.A. Sc. (McGill).	16th Nov., 1896
Shaw, Charles Aeneas, Greenwood, B.C. P.L.S. (B.C.).	6th Oct., 1877
Sherman, Ruyter Stinson, Mission City, B.C. P.L.S. (B.C.).	12th April, 1890
Smith, Henry, Toronto, Dept. of Lands, Forests and Mines D.L.S., Mem. Can. Soc. C.E.	8th Nov., 1861

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Stewart, Elihu, Ottawa, Dept. of Interior D.L.S., Chief Inspector of Forestry.	8th April, 1872
*Stewart, Louis Beaufort, Toronto, School of Prac. Science Dom. Top. Surveyor, Professor of Surveying.	6th April, 1882
Tracey, Thomas Henry, Vancouver, B.C. C.E., P.L.S. (B.C.), D.L.S.	8th April, 1870
Vicars, John Richard Odlum, Kamloops, B.C. P.L.S. (B.C.), D.L.S.	5th Jan., 1887
Wallace, Charles Hugh, 36 Dame st., Dublin, Ireland C.E. (Trin. Coll., Dublin), Dom. Top. Surveyor.	9th Nov., 1889
*Wheeler, Arthur Oliver, Calgary, Alta P.L.S. (B.C.), D.L.S., Topographer, Dept. of Interior.	8th July, 1881
Wicksteed, Henry King, Cobourg D.L.S., C.E.	7th Jan., 1886

SUMMARY.

Active members subject to dues	229
Active members exempted from dues	16
Withdrawn from practice (including nine Associates	76
Dead	71
Total number enrolled since incorporation	392

DECEASED MEMBERS.

NAME.	LATE RESIDENCE.	DATE OF P.L.S. CERTIFICATE.	DATE OF O.L.S. REGISTRATION.	DIED.
Abrey, George Brockitt	Toronto Junction	10th January, 1860	1892	25th June, 1906.
Barrett, Russell H	Pembroke		14th February, 1903	30th January, 1905.
Bigger, Samuel Howell	Ottawa		20th January, 1904	7th July, 1906.
Boiger, Francis	Lindsay	10th October, 1863	1892	3rd November, 1895.
Bolger, Thomas Oliver	Kingston	6th July, 1865	1892	—— ——
Bolton, Jesse Nunn	Toronto	6th April, 1867		—— ——, 1901.
Bowman, Leander Meyer	Toronto	14th April, 1892	1892	20th September, 1895.
Bray, Edgar	Oakville	6th October, 1866	1892	—— ——, 1908.
Brown, David Rose	Cornwall	10th October, 1850	1892	14th May, 1900.
Burke, William Robert	Ingersoll	5th April, 1878	1892	10th June, 1897.
Caddy, Cyprian F.	Campbellford	10th July, 1860	1892	August, 1905.
Caddy, Edward C.	Cobourg	18th December, 1846	1892	26th September, 1897.
Cheeseman, Thos.	Mitchell	11th July, 1856.	1892	—— ——, 1905.
Coad, Richard	Glencoe	8th October, 1879	1882	17th May, 1897.
Creswicke, Henry	Barrie	8th July, 1864	1892	22nd January, 1898.
Cromwell, Joseph M. O.	Perth	1st October, 1846	1892	19th October, 1897.
Davidson, Walter Stanley	Sarnia	9th April, 1884	1882	December, 1900.
Davis, John	Alton	5th April, 1878	1892	8th November, 1907.
Deane, Michael	Windsor	26th May, 1848	19th December, 1882	3rd April, 1897.
DeGurse, Joseph	Windsor	5th April, 1883	1892	22nd March, 1898.
Dobbie, Thos. Wm.	Tillsonburg	11th July, 1856	1892	—— ——, 1908.
Filmore, Stanley H	St. Thomas		17th February, 1902	16th June, 1904.
FitzGerald, James William	Peterborough	13th July, 1857	1892	——, 1901.
Foster, Frederick Lucas	Toronto	9th April, 1863	1892	27th July, 1899.
Fowlie, Albert	Orillia	13th January, 1863	1892	—— April, 1898.
Fraser, Charles	Wallaceburg	5th August, 1847		—— ——, 1905.
Gibbs, Thomas Fraser	Adolphustown	31st May, 1841	1892	17th April, 1893.
Gibson, James Alex.	Oshawa	7th April, 1855	1892	—— ——, 1903.
Gilliland, Thomas Brown	Eugenia	11th July, 1868	25th January, 1890	14th December, 1898.
Gilmour, Robert	Toronto	11th April, 1856	1892	29th December, 1903.
Hanning, Clement George	Preston	19th July, 1858	1892	7th May, 1905.
Haskins, William	Hamilton	5th July, 1855	1892	5th July, 1896.

Hermon, Royal Wilkinson	Rednersville	13th July, 1857	1892	9th February, 1907.
Hewson, Thomas Ringwood	Hamilton	6th July, 1877	1892	21st October, 1898.
Holland, Wm. Hugh	Toronto		1907 1st May	——— ———, 1908.
Howitt, Alfred	Gourock	12th January, 1856	1892	6th May, 1896.
Irwin, James Moore	Rat Portage	13th January, 1863	1892	——— ———, 1908.
Kains, Tom	Victoria	11th July, 1873		——— ———, 1901.
Kirk, Joseph Green	Stratford	16th February, 1843	1892	22nd January, 1900.
Lynch-Staunton, Francis H.	Hamilton	11th October, 1856	1892	11th June, 1899.
Macdougall, Allan Hay	Port Arthur	4th April, 1859	1892	—— February, 1906.
MacMillan, James Alexander	Calgary	6th January, 1877	24th December, 1894.	——— ———. 1898.
MacNab, John Chisholm	Hamilton	8th January, 1880	1894	16th October, 1897
McAree, John	Toronto	6th April, 1867	1894	12th December, 1903.
McCallum, James	Fort Francis	30th March, 1849	1894	—— July, 1900.
McDonel, Augustine	Chatham		1892	——— ———, 1908.
McGeorge, Wm. Graham	Chatham	8th January, 1866	1892	1st July, 1906.
McLatchie, John	Nelson, B. C.	9th January, 1864	1892	3rd February, 1908.
Malcolm, Sherman Morgan	Blenheim	81th October, 1858	1894	13th January, 1899.
Ogilvie, John Henry	Rat Portage	1th April, 1876	24th April, 1894	21st September, 1898.
Pedder, James Robert	Doon	10th November, 1891.	23rd December, 1892.	17th January, 1897.
Pope, Robert Tyndal	Ireland	13th April, 1875		——— ———, 1905.
Proudfoot, Hart William	Saskatoon, Assa.	6th May, 1905		31st March, 1906.
Reid, James Hales	Bowmanville	6th October, 1866	1892	22nd December, 1899.
Robinson, William	London	—— May, 1846	1892	11th October, 1894.
Rubidge, Tom S.	Cornwall	9th February, 1849	1892	——— June, 1904.
Sankey, Villiers	Toronto		1892	10th July, 1905.
Schofield, Milton C.	Guelph	28th September, 1843.	1892	19th February, 1908.
Simpson, George Albert	Winnipeg	7th October, 1864	1892	8th January, 1905.
Spry, W.				—— ——, 1906.
Squire, Richard Herbert	Brantford	14th April, 1896	1896	——— ———, 1908.
Steele, Edward Chas.	Sault Ste. Marie	9th April, 1889	1892	——— ———, 1908.
Strange, Henry	Rockwood	30th November, 1838.	1892	March, 1908.
Strathern, John	B.C.	5th October, 1876	1892	——— ———, 1897.
Tiernan, Joseph Martin	Tilbury Centre	7th January, 1886	1892	—— December, 1900.
Thomson, Augustus Clifford	Chicago	14th January, 1861	1892	—— December, 1896.
Van Buskirk, William Fraser	Stratford	7th April, 1883	1892	30th January, 1905.
Wagner, William	Ossowo	13th April, 1858		——— ———, 1901.
Walsh, Thomas William	Simcoe	25th April, 1842	1892	14th March, 1895.
Wheelock, Charles John	Orangeville	—— ———, 1856	1892	4th July, 1897.
Willson, Alfred				20th May, 1906.

Chas. Potter

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85 YONGE STREET, - TORONTO

NO. 25.

ANNUAL REPORT

OF THE

Association of Ontario Land Surveyors

ORGANIZED 1886 INCORPORATED 1892.

AND

PROCEEDINGS

AT THE

EIGHTEENTH ANNUAL MEETING SINCE INCORPORATION

HELD AT

TORONTO

MARCH 8th, 9th and 10th, 1910.

Printed for the Association by
THE STEVENSON PRINTING CO.,
184 Adelaide St. West,
Toronto.

Patronize Our Advertisers.

NOTICES.

MEMBERS and others will be supplied with copies of the Annual Reports for 1886, 1887, 1888, 1889, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909 or 1910, upon remitting to the Secretary fifty cents for each copy required.

Each member of the Association is reminded of the fact that for the next Annual Meeting a good programme is most desirable, and to ensure its preparation it is not now too early to bear the matter in mind.

In addition to its use as a library, the Repository now serves as a drafting room for members when copying Crown Lands plans and notes.

Published annually by the Association of Ontario Land Surveyors. Edition, 1350 copies; price, 50 cents.

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PREFACE.

To the Members of the Association of Ontario Land Surveyors:

The Proceedings of the Association at its Eighteenth Annual Meeting are herewith presented.

Respectfully submitted on behalf of the Council.

KILLALY GAMBLE,
Secretary.

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ASSOCIATION OF

ONTARIO LAND SURVEYORS

(INCORPORATED 1892.)

Organized 23rd February, 1886.

OFFICERS FOR 1910-11

PRESIDENT.

H. W. SELBY - - - - - Toronto.

VICE-PRESIDENT.

J. F. WHITSON - - - - . Toronto.

CHAIRMAN OF COUNCIL.

G. B. KIRKPATRICK - - - - Toronto.

SECRETARY-TREASURER.

KILLALY GAMBLE - - - - - Toronto.

MEMBERS OF COUNCIL.

Hon. Frank Cochrane, Commissioner Lands, Forests, and Mines.

P. S. Gibson, Willowdale, C. H. Fullerton, New Liskeard,	For term Ending April, 1913.
Alex. Niven, Haliburton, H. J. Beatty, Eganville,	For Term Ending April, 1912.
G. B. Kirkpatrick, Toronto, J. McC. Watson, Orillia,	For Term Ending April, 1911.

AUDITORS.

E. T. Wilkie - - - - Carleton Place.

H. L. Esten - - - - - Toronto.

BANKERS.

Imperial Bank of Canada (Yonge St. Branch), - Toronto.

BOARD OF EXAMINERS.

G. B. Kirkpatrick (Chairman).

P. S. Gibson, Willowdale,	For 3 years.
Alex. Niven, Haliburton.	
Thos. Fawcett, Niagara Falls,	For 2 years.
T. B. Speight, Toronto.	
G. B. Kirkpatrick, Toronto,	For 1 year.
Owen McKay, Walkerville.	

Killaly Gamble (Secretary of Board).

Note.—Board meets at Department of Lands, Forests and Mines, Parliament Buildings, 2nd Monday in February, 1911.

COMMITTEES, 1910-1911.

STANDING.

LAND SURVEYING—A. Niven (Chairman), A. J. van Nostrand, P. S. Gibson, J. Dickson, F. W. Wilkins, C. E. Fitton, T. B. Speight, H. J. Beatty, L. V. Rorke.

DRAINAGE—Geo. Ross (Chairman), C. A. Jones, J. J. Newman, A. S. Code, J. H. Moore, E. T. Wilkie, Geo. Smith.

ENGINEERING—J. Hutcheon (Chairman), E. B. Barrow, Owen McKay, J. D. Evans, T. H. Jones, L. V. Rorke, A. P. Walker, W. E. McMullen, W. M. Davis.

TOPOGRAPHICAL SURVEY.—T. Fawcett (Chairman), O. Klotz, L. B. Stewart, J. L. Morris, C. C. Fairchild, J. N. Wallace, R. W. DeMorest.

ENTERTAINMENT—J. F. Whitson (Chairman), A. J. van Nostrand, H. L. Esten, Killaly Gamble, W. A. McLean.

PUBLICATION—Killaly Gamble (Chairman), H. L. Esten, A. J. van Nostrand, J. F. Whitson, W. A. NcLean, D. D. James, H. de Q. Sewell.

SPECIAL.

LEGISLATION—G. B. Kirkpatrick (Chairman), Jas. Dickson, J. W. Fitzgerald, M. Gaviller, P. S. Gibson, C. A. Jones, A. Niven, Jas. Robertson, T. B. Speight, E. T. Wilkie.

REPOSITORY AND BIOGRAPHY—H. L. Esten (Chairman), C. Unwin, G. B. Kirkpatrick, J. F. Whitson, A. J. van Nostrand, Killaly Gamble.

EXPLORATION—H. W. Selby (Chairman), J. W. Tyrrell, L. V. Rorke, T. B. Speight, J. S. Dobie, W. W. Stull, A. T. Ward, H. T. Routly.

POLAR RESEARCH—Willis Chipman (Chairman), L. B. Stewart, O. J. Klotz, Thos. Fawcett, J. W. Tyrrell, J. F. Whitson, J. L. Morris.

PROGRAMME OF THE

Association of Ontario Land Surveyors

(INCORPORATED)

AT ITS EIGHTEENTH ANNUAL MEETING HELD AT TORONTO,
MARCH 8TH, 9TH AND 10TH, 1910.

PROGRAMME

Tuesday, 8th March—Morning, 10 o'clock.

IN THE ENGINEERS' CLUB.

Meeting of Council of Management.
Meeting of Standing and Special Committees.

Afternoon, 2 o'clock.

Reading of Minutes of previous meeting.	
Correspondence.	
President's Address.	Lewis Bolton.
Report of Council of Management.	
Report of Secretary-Treasurer, (including Financial Statement).	
Report of Board of Examiners.	
Report of Committee on Legislation.	G. B. Kirkpatrick, Chairman.
Report of Committee on Publication.	Killaly Gamble, Chairman.
Report of Committee on Topographical Survey.	T. Fawcett, Chairman.
Paper—"Mouths of the Pic River."	H. De Q. Sewell.

Evening, 8 o'clock.

Report of Committee on Exploration.	H. W. Selby, Chairman.
Paper—"The Interest of Ontario in the West."	H. W. Selby.
Paper—"Waterpowers in Northern Ontario."	L. V. Rorke.
Paper—"Game Preservation in Ontario."	Kelly Evans.

Wednesday, 9th March—Morning 10 o'clock.

IN THE ENGINEERS' CLUB.

Report of Committee on Engineering.	J. Hutcheon, Chairman.
Paper—"The Petroleum Industry of Lambton County."	L. A. Jones.
Paper—"The Principles of Road Supervision."	W. A. McLean.
Report of Committee on Drainage.	Geo. Ross, Chairman.
Paper—"Are Our Drainage Laws as Workable as They Should Be."	G. Smith.
Paper—"A Concrete Box Sewer."	Owen McKay.
Report of Committee on Repository and Biography.	H. L. Esten, Chairman

Afternoon, 2 o'clock.

Report of Committee on Land Surveying.	A. J. van Nostrand, Chairman.
Paper—"A Few General Observations."	James Dickson.
Paper—"New Brunswick Surveys."	W. E. McMullen.
Paper—"Autobiography of an Old Surveyor."	C. Unwin.
Report of Auditors.	

Thursday, 10th March—Morning, 10 o'clock.

IN THE ENGINEERS' CLUB.

Report of Committee on Polar Research.	Willis Chipman, Chairman.
Report of Committee on Entertainment.	J. F. Whitson, Chairman.

Nomination of Officers.—President, Vice-President, Secretary-Treasurer, Auditors, two Members of Council.

Unfinished Business.

New Business.

Adjournment.

CHARLES UNWIN, *City Surveyor,*
Registered Land Surveyor, 12th April, 1852.

[*See page* 9]

AUTOBIOGRAPHICAL SKETCH OF CHARLES UNWIN, O. L. S.

Read before the Association of Ontario Land Surveyors, at Toronto, 9th March, 1910.

EARLY DAYS OF LIFE.

On the 30th of December, in the year of our Lord, 1829, I, Charles Unwin, the subject of this paper, first saw the light of day in the old town of Mansfield, in the County of Nottingham, England, and in due time was sent to a Ladies' School, whence, at the age of 9 or 10, I was ignominiously expelled, for spoiling a girl's hat! I was quite innocent (of course), but I suppose that I was getting too big for the school. I was then sent to a boys' school, kept by the writing master of the former school, and from there went to Grove House Academy, a much more aristocratic seat of learning. A short time after my admission to this Academy its Headmaster and the Principal of the Royal Grammar School joined forces, and I, with the rest of the Grove House boys, was transferred to the Royal Grammar School, which was established in the reign of Queen Elizabeth.

LEAVING ENGLAND — HO! FOR CANADA.

When I was thirteen and a half years of age my uncle, the late Charles Unwin, who was at that time a clerk in the Registry Office in Toronto, sent for me to come to that city. I may say that my father, James Browne Unwin, died when I was only about six and a half years old. There was living in Mansfield at this time a gentleman named Earnshaw, an architect and builder. My friends having learned that he was going to America, asked him whether he would take charge of my sister and me. This he most kindly consented to do, and right royally did he keep his promise, for had we been his nearest and dearest friends he could not have done more for us. We drove from Mansfield to Nottingham, some fourteen miles, in a stage-coach, thence went to Liverpool in a railway carriage. The third class cars were open, as I well remember, as before we got to Liverpool it had begun to rain. We arrived at Liverpool on a Saturday, and sailed for New York in an American sailing vessel named "Liberty" on the following morning. As we sailed away the church bells were ringing for service.

After a five weeks' voyage we landed in New York and took a steamboat for Albany; thence we travelled by Erie Canal to Oswego, and thence by a steamer named "Rochester" to Toronto, landing there on Wednesday, the 28th June, 1843, about 9 a.m. We drove from the wharf in a little cab (with its door in the back of it) to my uncle's home. Our kind protector, Mr. Earnshaw, left his family at Oswego and brought us to the very house, just stayed to have a meal, and then returned to his family at Oswego, and continued his journey to Wisconsin. I did not think much of his kindness at the time, but after coming to years of discretion I came to the conclusion that there was not one man in a thousand who would have done so much for two children whom he had not even known before leaving home.

NOTES OF REGISTRARS AND REGISTRY OFFICES.

I may mention that the late Samuel Ridout, with whom my uncle lived, was his brother-in-law. Mr. Ridout was at one time Sheriff of the County of York, and at this time Registrar, not only of Toronto, but of the Counties of York, Ontario and Peel. The office was a small two-storey brick building standing on the north side of Adelaide street, opposite the Rectory of St. James' Church. If I remember rightly, the only clerks in the office were my uncle and the late John Ridout, who was Deputy Registrar, and subsequently Registrar.

I find in Robertson's Landmarks of Toronto, Vol. 2, page 673, that "in 1829 Mr. Samuel Ridout built at his own expense for the purpose of a Registry Office a small brick building on the north side o Adelaide street, opposite St. James' Church" (Rectory, C. U.). This building has been destroyed.

In 1849, while Mr. Ridout held this office, a law was enacted to the effect that no Registry Office should be kept in a private residence, but must be maintained in a public building. (The Registry Office in Toronto had previously been kept in the private house of the Registrar, or in a rented room).

At the same time the office was established as the County Registry. As yet there was no distinct City Registry, the city forming part of the county.

In accordance with the Act of 1849, the County built a small one-storey stone fire-proof building, where the office of the Gas Company now stands, on the east side of Toronto street, just north of Court street. This building was destroyed to make way for the building which now occupies the site.

In 1855, Mr. John Ridout, who had been Deputy Registrar for many years, succeeded on the death of his father, Samuel Ridout, to the office. Mr. John Ridout died Sept. 15th, 1894, aged 88. In 1859 the County and City Registrarships were divided. In 1875 the present brick County Registry building was erected at the northeast corner of Richmond and Clare (now Berti) streets. When the city and county offices were separated, Joseph Morrison became the first City Registrar. The present City Registry office was put up by the city during the time that Mr. Charles Lindsey was Registrar.

UPPER CANADA COLLEGE DAYS.

Upper Canada College was built in 1829, the year in which I was born, and to it my good uncle sent me within a week of my arrival in Toronto, and there I remained until March, 1847. The Masters were: Mr. Barron, Principal; Rev. Mr. Scadding, 1st Rector of the Church of the Holy Trinity, 1st Classical Master; Rev. Mr. Ripley, 1st Rector of Trinity Church, King street east, 2nd Classical Master; Rev. Mr. Maynard, Mathematical Master; Mr. De la Haye, French Master; Mr. Duffy, English Master; Mr. Cozens, Preparatory Master and Boarding-House Keeper.

A SATURDAY FIGHT.

When I came to Canada I was a little round-faced, chubby fellow, and full of fight when anyone called me names or made fun of my Nottinghamshire dialect. The son of a celebrated ironmonger, a boy who was considered to be a bit of a bully, was particularly fond of annoying me, and at last I was annoyed beyond endurance, so I decided to fight him. The day was Thursday, if I remember rightly, and as I was to go to a party that night and did not wish to have my face disfigured, I decided not to fight until Saturday, when we would have more time to settle our little affair. Saturday came, and with it the fight. We were both pretty well marked and the late Hutchinson Esten, son of Chancellor Esten, who was in the same (2nd) Form as I was, went home and with great glee announced that Charlie Unwin had given Charlie Harris a licking. My uncle happened to be visiting at Mr. Esten's, and heard what Hutchinson said. At dinner that day he looked up at me and asked what I had done to my face. I said, "Nothing." Then he remarked that it looked as if some ironmonger had been wiping his hands on it, so I had to confess. Harris and I were the best of friends after, and he used to help me with my lessons.

REV. GEORGE MAYNARD.

On one occasion I, with about a dozen others who were not well up in their mathematics, had the enunciations of the first book of Euclid to write out for next morning. My sister and I were to go to a party that evening at Mr. Charles Small's (father of the late John Small, Collector of Customs here,) who was then Clerk of the Crown, and to whose hospitable house we were often invited. I did not like to miss the party, and knowing that if I did not do the imposition the master would "do" me in the morning, and that with this thought hanging over me my pleasure at the party would be very much diminished, I asked the Master, the Rev. George Maynard, if he would "kindly punish me now," which he did, much to my relief, as I then had no dread of the morning ; the other fellows had it all to themselves.

MR. DUFFY.

One time the late Chief Justice Armour was requested by the English Master, Mr. Duffy, or as he was generally called by the boys, "Old Duffy," to examine our Form in Geography.

There was a map hanging on the blackboard at the end of the room, and Armour asked the head boy to point out the Tear. He went up to the map but could not find the Tear. The second and third boys also failed, and so on down to about the middle of the class where I was. When my turn came I, noticing a smile on Armour's face at the failure of the boys, and seeing a hole in the map, went up and pointed out the "tear" with a small "t." "Go up head, Unwin," said Mr. Armour, and there I was for a time —a short time.

DR. SCADDING.

One winter's morning the wind was blowing through a crack in the wall just at the small of my back, and I kept putting up my hand and rubbing my back. Mr. Scadding (the late dearly beloved Dr. Scadding) said: "What is the matter with you, Unwin?" "Why, sir," I said, "there is wind enough here to turn a mill." This was a very common expression in Nottinghamshire where, in my boyhood days, many wind-mills were used to grind the wheat, or, as it was called, the corn.

DR. BARRETT.

Dr. Barrett was a great disciplinarian. One winter morning he punished two boys, Tom and John Helliwell, who had walked from the brewery at the foot of the hill at Todmorden to Upper Canada College, and were about five minutes late.

What would the boys of this year of our Lord think of walking three and a half miles through the snow and being punished for being a little late? I must say, however, that the punishment was not severe.

In these school-days my cousins used to shoot wild pigeons in what are now the Allan Gardens, and there was a swimming pool at the northeast corner of Carlton and Sherbourne streets.

CHANGES IN AND NEAR THE CITY.

On my way to the College, which was then between King and Adelaide, and Simcoe and John streets, I used to pass a very unpleasant smelling tannery, where the Toronto "News" office now stands, on the southwest corner of Adelaide and Yonge streets, known as Ketchum's Tannery. The proprietor was Jesse Ketchum, and one of our Public Schools is named after him. To this day Sunday schools in the city benefit by his bequest for prizes.

The General Hospital was at the northwest corner of King and John streets, where the Arlington Hotel now stands. During the emigrant fever in 1847 there were temporary sheds extending from the rear of the Hospital to Adelaide street. Our good old Bishop Strachan and the Roman Catholic Bishop Power were frequently seen ministering to the sick in those sheds. (I was then measuring the houses all through the city, of which more anon.)

Queen street in my school days was not opened between George and Caroline (now Sherbourne) streets, but was enclosed with the grounds of the Hon. William Allan, father of the late Hon. George W. Allan. In fact it was not opened for some years after, for I well remember coming home from a long survey with my clothes in very bad condition and avoiding all the principal thoroughfares that I could, and going through the field in front of Mr. Allan's house (Moss Park) where Queen street with its fine shops is now travelled between George and Sherbourne streets.

STAGE COACHES.

The stage coaches running to Montreal, and I think, Hamilton and Holland Landing, started from the corner of Church and Front streets.

The mention of Hamilton brings to my remembrance the fact that that place was quite a rival to Toronto in those days. There were two steamboat companies, one Richardson & Co., and the other Bethune & Co., having boats plying between the two cities. They had runners, or touters, soliciting passengers at the foot of Yonge street, and almost compelling people to take one or other of their boats. For a short time one company offered to take a passenger for nothing and give him his breakfast !

HOLLAND LANDING.

Holland Landing, before the Northern Railway was built, was a very stirring place. The steamer "Beaver" used to come down the east branch of the Holland River, and plied between Holland Landing and Barrie, Beaverton, Atherley and Orillia. But, alas ! the old town is now very dead, and will, I fear, remain so until the much scoffed at canal is thrown open for business.

POST OFFICE.

When I first came to Toronto the Post Office was on the west side of Yonge street between Front and Wellington streets. When removed from there it went to the north side of Wellington street, where the Imperial Bank now stands. During my apprenticeship I had occasion to come to town from Weston on horseback, and turning round the corner of Yonge and Wellington streets, my horse slipped and fell, it being smooth shod and the planks of the roadway being wet from a recent rainfall. Wellington street was then planked, as was also Bathurst street, then called Crookshanks' Lane. From Wellington street the next move of the Post Office was to Toronto street, where the office of the

Assistant Receiver-General now is. From there it went to its present position on Adelaide street, facing down Toronto street. Before the present Post Office building was erected there was on its site a livery stable kept by a colored man named Mink, who had a daughter who was a fine-looking woman. It was commonly reported that he offered any respectable white man a handsome sum if he would marry this daughter. An American took the offer, and took his bride to the Southern States where he sold her into slavery.

It was said that Mr. Mink was quite wealthy, and I believe that he was pretty well off. He had a fine lot of horses and carriages. I drove a bride and groom in a carriage and pair from his stables one day in May, 1855, and a friend of mine drove in another of his carriages some more of the wedding party.

LEARNING THE PROFESSION.

On my leaving Upper Canada College I went to Weston to learn surveying with the late Col. Dennis, sometime Surveyor-General, but then simply John Stoughton Dennis, P.L.S., with whom I lived during my apprenticeship. I was very kindly treated by him and his household, then consisting of his grandmother and Aunt Stoughton. Within a short time of my joining his hospitable circle he took unto himself a wife, Miss Oliver, a lady from Kingston, and she, too, was very kind to me.

At the time of the wedding, Mr. Prosser (a senior pupil) and I were sent to stake out lots on the Indian Peninsula on Balsam Lake, and, before our return, to make a survey in the Township of Mara, where I had my first experience of a full house. There were, I think, twelve or fourteen in the one-roomed shanty.

To get from Balsam Lake to Atherley, where the steamer had left me, I had to go to Point Mara in a small boat, with provisions. A Roman Catholic missionary, a fine old French gentleman named Father Proulx, was desirous of going there also, but I had not room for him in my boat, so told him that if he could get a boat I would let him have a man to help him row. He got one, but it proved to be old and leaky, and those in it were obliged to abandon it and take to the land, where the walking was drier. I with my party got to Point Mara just as the sun was going down, and a beautiful sunset it was. We found a deserted shanty, the floor of which was well covered with apparently clean straw. Being all very tired we soon turned in, and were mightily glad soon to turn out again, for the straw was full of fleas, as the cattle had been sleeping there. I remember that my underclothes were literally blue with them. I took off as many as I could before tramping to Balsam Lake, where we arrived towards evening. I was invited to have tea with a very nice family named Stephenson. But I shall never forget the misery I was in from those pesky fleas.

In the morning we got a canoe and paddled to the peninsula, where were the remains of some Indian log houses. I revisited this spot in August, 1907, and gave my description of its present state in a paper read before this Association in February, 1908.

WALKING BETWEEN TORONTO AND WESTON.

When living in Weston I used frequently to walk to Toronto on Saturday night and back to Weston on Monday morning before breakfast hour, but not before I had taken some myself. The distance between the extreme points of my journey was about 9 or 10 miles. There were no street cars in those days, and a walk of nine or ten miles was not thought much of.

I well remember when walking home, on one occasion, falling in with an Irishman who carried an umbrella. The telegraph wires had recently been strung along Dundas street and when we heard the vibration, the Irishman, holding up his umbrella, exclaimed loudly, "Whisht ! they're sindin' the news !"

Speaking of Dundas street reminds me that once in 1854 when we were going to spend the evening with my cousin, Mrs. Harrison, at Foxley, one of my sisters on arriving there discovered that she had lost her watch. She thought that most likely she had lost it in the bus, then running, I think, between the market and the asylum, but on our way home we found the watch lying on the sidewalk, where it had been for probably two or three hours.

FIRST TIME IN CHARGE OF A SURVEYING PARTY.

During my apprenticeship I was engaged in surveying part of the Townships of Bentinck and Glenelg. This was the first time that I had charge of a surveying party.

Before Mr. Dennis left me to continue the survey of Bentinck, he and I used to run the one a northerly and southerly line and the other an easterly and westerly one. I tried to be at the intersection first, and encouraged my men to try and beat the "boss." One time when the snow was pretty deep and we were working quite late, for I hated to be beaten, we got to where the intersection should occur, but we did not either see or hear the other party. We made all the noise we could, but got no answer, so we determined to make for camp, which was, I think, over two miles away. We made torches of dry cedar bark, so that by their blazes we could see the other blazes. One old man whom I had in my party got a good clip over an eye from a branch, and declared that fire flew out of it. One of the boys told him in fun that he saw it too, and in telling the story the old man said it was "true, for Tom saw it." When we got to camp we found to our disgust that the boss's party had not gone out, but had remained in camp making snowshoes out of cedar shingles and sole leather. My men tried them the next day, and said that they would sooner break track than use them—and they did so for the rest of the winter, each taking turns in going ahead.

A MAP OF TORONTO.

I also surveyed many Indian Reserves during my apprenticeship, but before these surveys of which I speak, Mr. Dennis conceived the idea of publishing a map of the city of Toronto.

The late J. G. Howard, I believe, gave him the outlines of many of the blocks, and I think that I may say that I measured every house in the then city, with the exception of the old and new garrisons.

Sir Sandford Fleming plotted the notes, and himself engraved the map on stone, and a more beautiful piece of lithography could scarcely be found anywhere. I assisted Sir Sandford in traversing the Garrison Creek which appears on the plan. The great drawback to this plan was that it was too small (12 chains, or 792 feet to one inch) to be of any practical value, but it made a beautiful picture, and was most accurately done. I had a mutilated copy of this plan which I prized very highly, and which I lent to Mr. J. Ross Robertson, who has, I understand, had reproductions of it made, one of which he has promised me.

Toronto has made great strides since I came in 1843. The population was then about 17,000; now it is said to be about 400,000. Its eastern boundary was the Don (with the exception of the strip lying south of Queen street, then called the Kingston Road, and running to within about half a mile of the Township of Scarboro', or a little over three miles), and its western and northern boundaries were Dufferin and Bloor streets respectively.

SURVEY OF THE MARSH.

I made for the city a survey of the Marsh in 1872, a plan of which, dated 1873, is filed in the Crown Lands Department.

By power dated 19th July, 1877, I was appointed attorney for the city to settle and determine all and any questions and disputes between the city and property owners, with reference to the boundary between the Marsh and the broken front lots.

I defined a boundary between the city and the different owners, and planted cedar posts from 9 to 10 feet long along the lines, and had iron caps put on the tops of these posts. I planted a post with crockery and a broken iron pot at the intersection of the Lake shore and the line between lots 4 and 5, commonly called the arbitration line from the fact that in a law-suit between the owners of these lots the jury could not agree, and the matter was settled by arbitration.

There were cut stone monuments planted on the south side of Danforth avenue, then called Danforth road, or if I mistake not, the Don and Danforth road; on the north and south sides of the Kingston Road, and, I think, on the north side of Queen street.

RETRACING OF WINDMILL LINE.

I made a survey of the windmill line, or rather retraced it from information got from the late J. G. Howard and the late George Gooderham, or, if not George, one of his brothers. Mr. Howard gave me a point on Tinning's Wharf (at the foot of York street), and Mr. Gooderham one where the old windmill used to stand, and I produced the line westerly. The mill was doing a grinding business for some years after my coming to Toronto. My plan of the windmill line is dated January, 1884, but the survey was made some little time before that date.

ENTERED SERVICE OF CITY.

On Saturday, the 7th December, 1872, I with the late Weymouth Schreiber, the late Samuel Ridout (son of the former Registrar Samuel Ridout), the late Nicholas Maughan afterwards Assessment Commissioner), the late W. Kauffman, Thomas McCaul and Patrick Hynes were appointed valuators, afterwards assessors, for the city of Toronto, the late Mr. S. B. Harman being our Chairman. Of these eight it will appear that five are dead ; those still living cannot expect to be here much longer.

I was assessor until January, 1905, when on the 25th day of that month, I was appointed City Surveyor which office I still hold. The work is congenial to me. Two of my assistants who have been in the office for about 20 years, were before in my own office.

I have served under the following Mayors : Jos. Sheard, Alex. Manning, F. H. Medcalf, Angus Morrison, Jas. Beatty, jr., W. B. McMurrich, A. R. Boswell, W. H. Howland, E. F. Clarke, R. J. Fleming, Warring Kennedy, John Shaw, E. A. McDonald, Oliver A. Howland, Thomas Urquhart, Emerson Coatsworth and Joseph Oliver, and now have as head of the municipal system George Reginald Geary.

BUSINESS PARTNERS.

During my professional life I have had among others the following partners :

Under the firm name of Wadsworth & Unwin, Mr. Vernon B. Wadsworth, now manager of the London and Canada Loan and Agency Co., and Mr. R. H. Coleman, now Commissioner of the Canada Company. Under the firm name of Wadsworth, Unwin & Browne, Messrs. H. J. Browne and W. A. Browne.

Under the firm name of Unwin, Browne & Sankey, Mr. Villiers Sankey, who was afterwards City Surveyor, and to whom I succeeded in that office on his joining the Grand Trunk Pacific staff. Under the firm name of Unwin, Foster & Proudfoot, my cousin, Mr. Fred. L. Foster, and Mr. H. B. Proudfoot.

My last partners were Messrs. C. J. Murphy and H. L. Esten, under the firm name of Unwin, Murphy & Esten, from which partnership I retired in 1896, although the firm name remains unchanged.

Great has been the expansion and many have been the changes in this city of Toronto since first I entered it.

Wonderful has been the increase in importance of my beloved adopted country, especially since it began its career as a Dominion on July 1st, 1867.

Marvellous have been the mighty strides of the great British Empire during the days of the years of my life under George the Fourth, William the Fourth, Victoria the Good—remembered, honored and revered—and her worthy son, Edward the Seventh, the "Peace Maker."

May the City of Toronto, the Dominion of Canada and the Empire continue under the blessing of the All Father to grow towards the Light, and increase, not only in material things, but better far, in moral fibre and spirituality and in the Fear of God. May their peoples realize that "a good name is rather to be chosen than great riches," and may their desire be to "keep innocency, and take heed unto the thing that is right, for that shall bring a man peace at the last."

DISCUSSION.

Mr. Kirkpatrick—It gives me pleasure to move a vote of thanks to Mr. Unwin for his most interesting biography. I hope that the younger men will be able to write their biography in such a manner. It is an inspiration to all the young men here to do just as Mr. Unwin says in his closing paragraph, "Do rightly, act justly and live honestly in the sight of God." I have much pleasure in moving a vote of thanks to Mr. Unwin, and I move that the paper be printed in the Association's proceedings.

Mr. Niven—I have much pleasure in seconding that motion. I may say I first met Mr. Unwin at Jackson's Point in 1856, when I first started out as the pupil of the late F. S. Passmore, and I have met him frequently and been on intimate terms with him almost ever since. I have enjoyed the biography very much, and I hope, as Mr. Kirkpatrick says, many more will try to emulate it. (Applause). The motion was carried.

Minutes of the Eighteenth Annual Meeting

— OF THE —

Association of Ontario Land Surveyors

HELD AT THE ENGINEERS' CLUB, 96 KING ST. WEST,
ON THE 8TH, 9TH AND 10TH MARCH, 1910.

The following members were present :

Abrey, George Spencer.
Ardagh, Arthur Gowan.
Aylsworth, Charles Fraser, Jr.
Baker, Mason Herman.
Barrow, Ernest George.
Beatty, Herbert John.
Bell, James Anthony.
Bolton, Lewis.
Browne, William Albert.
Bush, Clayton Elgin.
Chase, Albert Victor.
Chipman, Willis.
Crerar, Samuel Rutherford.
Dalton, John Joseph.
Fawcett, Thomas.
Fullerton, Charles Herbert.
Gamble, Killaly.
Gibson, Wilbert Silas.
Griffin, Albert Dyke, B.A.
Hutcheon, James.
Jones, Charles Albert.
Kirkpatrick, George Brownly.
Le May, Tracy Deavin.
McLean, William Arthur.
Miller, Frederick Fraser.
Murphy, Charles Joseph.
Niven, Alexander.
Patten, Thaddeus James.
Phillips, E. P. A.
Pierce, John Wesley.
Rorke, Louis Valentine.
Ross, George.
Routly, Herbert Thomas.
Rutherford, T. N.
Selby, Henry Walter.
Sewell, Henry DeQuincy.
Smith, George.
Speight, Thomas Bailey.
Unwin, Charles.
van Nostrand, Arthur J.
Wilson, D. L. S.
Walker, Alfred Paverley.
Ward, Archeson Thomas.
Warren, James.
Watson, John McCormack.
Wilkie, Edward Thomson.
Stewart Elihu.

On Tuesday, March 8th, at 2.30 p.m. the President (Mr. Lewis Bolton) called the meeting to order and said : Gentlemen, it is about time we commenced our meeting. The first thing on the programme is the reading of the minutes of the previous meeting.

The Secretary—The minutes of the previous meeting have been published in our proceedings, and I would request some gentleman to propose that the minutes be taken as read.

Mr. Wilkie—Mr. Chairman, I move the minutes be taken as read, but I would like to have a slight correction made. In the paper which I read at the last annual meeting, which appears on page 153 of the printed minutes, the title being "The Seigniory of Longueuil," in the tenth line the date is given as 1874 ; it should have been 1674. With that correction I would move that the minutes be taken as read.

Mr. Browne seconded the motion, which was carried.

The President—The next thing is the correspondence.

The Secretary—There is no correspondence that it is necessary to bring before the meeting. There has been some correspondence with our Solicitor with regard to the question that was brought before the meeting last year, that of the protection of surveyors in the execution of their business, and the matter now stands in this way, that the Province of Quebec and the Province of New Brunswick have both taken up the same question, and they are both forwarding their views (New Brunswick is acting somewhat with us, but Quebec independently), and urging the Minister of Justice to have a law passed provincially, and if it is passed provincially for one province it will be passed for another. Mr. Bristol has our application in his hands, and he says he thinks it will very soon be acted upon one way or the other. He is not quite sure whether the Minister of Justice will accede to our wishes. A surveyor, Mr. Carre, wrote asking to have exemption from dues under the Statute, and I think that the Council will probably accede to his wishes.

The President—The next thing on the programme is the President's address. This will be short and sweet like a donkey's gallop. When I sat down to write it out I was very much discouraged; I didn't feel equal to the occasion. However, I will give you what I have got.

The President then read his address, which was received with applause.

The President—The next thing on the programme is the report of the Secretary Treasurer, including the financial statement.

The Secretary read his report as Secretary-Treasurer (including financial statement).

Mr. Niven moved, seconded by Mr. Selby, that the Secretary Treasurer's report be received, and the financial statement handed to the Auditors. The motion was carried.

The President—I understand the report of the Board of Examiners and the report of the Committee on Legislation are not ready yet. The next is the report of the Committee on Publication.

The Secretary—With regard to the report of the Committee on Publication I have nothing to add from last year except what I have mentioned with regard to the Ohio Society of Engineers having withdrawn from our exchange list. I will put in the report formally this evening or to-morrow morning.

Mr. Sewell moved, seconded by Mr. Murphy, that the report be taken as read. The motion was carried.

The President—The next is the report of the Committee on Topographical Survey, Mr. T. Fawcett, Chairman.

Mr. Fawcett—I regret that I have not had more time to devote to this subject. I have been busy right up to the date of this meeting, so that the report I have is only a summary. I hope I may be able to obtain some information at a later date and prepare the report for publication. If not, I hope the brief report which I have will prove useful in some respects.

Mr. Fawcett then read the report of the Committee on Topographical Survey, and moved, seconded by Mr. Sewell, that it be adopted. The motion was carried with applause.

The President—The next on the programme is a paper by Mr. H. De Q. Sewell on "Mouths of the Pic River."

Mr. Sewell—I wrote this paper with regard to some explorations that I made for railway purposes. I noticed there was much, presumably aquatic, disturbance in that neighborhood, and I thought when I was asked to write a paper probably it would be a good subject.

Mr. Sewell then read his paper which was illustrated by a tracing. The paper was received with applause.

The Secretary—Mr. Selby is ready now with his report on Exploration.

Mr. Selby, in presenting the report of the Committee on Exploration, said : I have been unable to get the Committee together to get up details for a report. I have letters from two or three of the members making suggestions, but most of this report is from my own pen.

Mr. Selby then read the report of the Committee on Exploration.

The Secretary—There is nothing else for this afternoon session unless we read Mr. McMullen's paper on "New Brunswick Surveys," which is on the programme for tomorrow afternoon.

In the absence of Mr. McMullen, Mr. Wilkie read the paper. (Accompanying the paper were a number of small blue prints giving examples of surveys made in New Brunswick).

The President—If there is any gentleman who wishes to make any remarks on this paper we will have them now.

Mr. Fawcett—It will be a very valuable addition to our report to have accounts of the surveys in the different provinces. It is a very appropriate paper. The thanks of this Association should be tendered to Mr. McMullen for this paper, and I would make that motion, and that the paper be published in our proceedings.

Mr. Sewell—I second that. Carried with applause.

At four o'clock p.m. the meeting adjourned to meet at eight o'clock p.m.

EVENING SESSION, TUESDAY, 8 P.M.

At 8.15 the President, Mr. Bolton, took the chair, called the meeting to order, and said: Gentlemen, it is after eight o'clock, I think we had better commence our evening session. We will take up first of all the report of the Board of Examiners, to be presented by Mr. Kirkpatrick.

Mr. Kirkpatrick read the report and moved, seconded by Mr. Fawcett, that the report be adopted.

The President—I understand Mr. Evans is ready now to address you.

Mr. Kelly Evans then addressed the Convention on "Fish and Game Preservation in Ontario."

10.20 p.m., adjourned to meet Wednesday, March 9th, at 10.30 a.m.

MORNING SESSION, WEDNESDAY, MARCH 9TH, 1910.

At 10.30 a.m. the President called the Convention to order and called upon Mr. Selby to read his paper on, "The Interest of Ontario in the West."

Mr. H. W. Selby then read his paper, which was received with applause.

The President then called on Mr. C. A. Jones to read his paper on "The Petroleum Industry of Lambton County."

Mr. Jones then read his paper.

Mr. Warren—I have heard with a great deal of interest the paper Mr. Jones has given us, and already I am personally acquainted with the subject. I was in that country at one time. I was in Oil Springs a day or two after that great well was struck, and I have been down Bar Creek and have seen rivers of oil running away, and I have watched these jack poles that they used. The industry at that time was in a crude state, but now they have a scientific way of dealing with the oil. I have much pleasure in moving a vote of thanks to Mr. Jones for the able paper he has given us.

Mr. Selby—I have a great deal of pleasure in seconding the motion. I think papers like that are of great interest not only to the public generally, but particularly to the Ontario Land Surveyors. I think we ought to know a little about everything, but this is one of the subjects we probably would not have the opportunity of learning about except in this way.

The President put the motion, which, on a vote having been taken, was declared carried, with applause.

The President—The next thing on our programme is the report of the Committee on Drainage.

Mr. George Ross, Chairman of the Committee, read the report of the Committee on Drainage, and moved, seconded by Mr. Jones, that the report be adopted. The motion was carried.

The President called on Mr. G. Smith to read his paper on "Are our Drainage Laws as Workable as They Should Be."

Mr. G. Smith then read his paper.

12.30 p.m., adjourned to meet at 2.30 o'clock p.m.

AFTERNOON SESSION, WEDNESDAY, 2.30 P.M.

The President called the meeting to order and said:—Gentlemen, I see Mr. McLean is here, and probably we had better have his paper on "The Principles of Road Supervision," but first of all, we will have the report of the Committee appointed last evening.

Mr. Sewell read the report of the Special Committee appointed on the question of raising the fees for the final examination to $200, and on the question of appointing a paid inspector to secure evidence as to irregularities, and moved the adoption of the report.

The Secretary—Don't you think we had better wait until we have a fuller meeting to discuss the question?

Mr. Sewell—It can be laid over for discussion. We discussed it pretty well yesterday.

Mr. Wilkie—Mr. President, I feel like the Secretary, it might be advisable to leave this one for a little while. The members are filing in rapidly, and this is a question on which there is room for a great deal of discussion, and it will give those who come in a little later in the afternoon a chance to discuss it.

Mr. Sewell moved, seconded by Mr. Hutcheon, that the report be laid over until later on, and be taken as read, for the present. The motion was carried.

Mr. W. A. McLean, C.E., then read his paper on "The Principles of Road Supervision," which was received with applause.

The President—We will now have the report of the Committee on Engineering. Mr. Hutcheon is the Chairman.

Mr. Hutcheon—Like a great many of the other Chairmen of Committees, I found it impossible to have a meeting. Very few of the members have been here until to-day, so I have drafted a short report which I will read, and I will also read letters which I received from Mr. Barrow and Mr. Owen McKay.

Mr. Hutcheon then read the report, and moved, seconded by Mr. Niven, that the report be adopted and printed in the minutes of the Association. The motion was carried.

The President The next will be the report of the Committee on Land Surveying, of which Mr. A. J. van Nostrand is Chairman.

Mr. van Nostrand read the report.

The President—We will take up now the report of the Special Committee re raising the fees for the final examination to $200, etc. (The report was re-read by the Secretary.)

Mr. Routly—It seemed impossible to get a full meeting of the Committee. Mr. Sewell arranged for a meeting after the close of this morning's session. The idea of that resolution was largely to leave it to the Association. Personally I have not given the matter a great deal of thought regarding fees, and I don't feel very strongly about that, but I do about the other part in connection with the discussion that has recently taken place in regard to the personal presence on the ground of the surveyor. The same question will arise if there are men who will sign plans without having been there ; the same men will continue to do so, no matter what certificate you make unless you make the penalty severe and inflict the penalty. I feel something should be done in regard to protecting the members against unlicensed practitioners and against members of the profession who do not feel strongly the personal, moral principle of signing an affidavit that is not exactly correct.

The matter of fees should be handled with a good deal of care and left with a special committee to search the thing out and give it more mature deliberation than personally I have been able to do. As to the other I have felt for the last two years something must be done. It has been put up to me recently in Haileybury by a gentleman there who is not a client of mine, who says, "You people are a close corporation ; you have been given certain privileges, and along with those privileges you have got certain responsibilities." It so happened that a firm had been surveying where he had a claim and had gone ahead and surveyed his claim without his knowledge, and were billing him for it. He asked me what he should do. He pressed me, and I said, knowing who did the work, "I would advise you to have it re-surveyed." I know the work done by that particular man is very carelessly done. I have been asked two or three times here with regard to the standing of a certain man. I don't wish to say anything, but there is a man in the City of Toronto at the present time who is endeavoring to secure the services of an Ontario Land Surveyor ; he claims to have a large number of claims to survey, and he is one of the men of whom we have had complaint to make in the North Country. I would like at this time to suggest to the younger members who are not placed, that before they make any arrangement they had better look into the thing pretty thoroughly.

Mr. Niven—Mr. Chairman, the second clause of this report reads as follows : "That this Association appoint an inspector or official to whom the members of the Association may confidentially report any cases of irregularities with regard to the personal supervision clause; and also regarding surveys made by unlicensed practitioners with a view to collecting evidence and reporting the same to the Council with a view to prosecution." Now, I entirely agree with that clause, I have no objection to that. The next clause reads: "That the Minister of Lands, Forests and Mines be requested to secure Legislation to raise the fee for admission to practice to $200." Now, gentlemen, I think that figure is too high. At the time we got incorporation I think the fee was $20, and it was raised to $30. It is $30 now, with other things. At that time the Hon. Mr. Hardy had charge of our bill, and it was suggested that the fee should be put higher, and he said he thought we would be acting unwisely if we did because we might create an opposition to our Bill; there were so many things being taken up by the Trades and Labor people now-a-days, that they would get up an opposition to our Bill, and we might not get along as well as we would if we were acting in a moderate sort of manner. Consequently the fee was put at $30. I would not object to put it at $50. That is what they charge in Manitoba. I don't know what they have got in British Columbia and Alberta. I don't think $50 would be unreasonable, but I think $200 is too much for a young man to pay who is launching out in the profession.

Mr. van Nostrand—Mr. Chairman, I had the honor of being a member of that Committee, but I lack the honor of having been present at the meeting. I was in the building all morning but the meeting didn't find me, and so I hadn't an opportunity of expressing myself before the Committee. If there had been a minority report I think I would have headed that.

I quite agree with what Mr. Niven has said, as when we first asked for incorporation in 1892, as well as I remember, we had placed the fee at $50, and the Hon. Mr. Hardy, who was our good friend all through, advised us in our own interests not to seek to get more than $30, if we could manage to get along and pay the expenses of the Board on that, with the assistance of the Government to the extent of their representation on the Board; that that was about all we should ask under the conditions. There were a great many people, people of combined influence, and organizations that were rather opposed to class legislation, and if we asked for too much we would get nothing. I think those influences are still at work, and perhaps strengthened rather than weakened, so that any further attempt to encroach on what they think are the rights of the public will be met with very strong opposition, and we might slip back instead of moving forward.

I suppose when this comes up for a vote we will have a chance of expressing ourselves on it, and accepting or rejecting the report of the Committee.

With regard to the inspector, I don't think that the Association requires any additional fees at the present time to be in a financial position to protect its members. The report of the Secretary shows somewhere about $4,000 balance, and under the Statute we are limited I think to about $5,000, so we will have to get busy and spend some of it. If the members who are aggrieved about irregular practice going on about them, either by authorized Land Surveyors, or by unlicensed persons, will communicate with the Council, I think that the Council could be relied upon to take the matter up and sift it thoroughly, and, if necessary, engage this special officer to assist them. If cases are brought before them that seem to be worth fighting in court, I am sure they will do it. Personally, when I was on the Council, I remember a case in the Rainy River District where a man was brought up and fined $40, and that was held up as a horrible example to all the other people in that district, and I don't think the offence was repeated. If an example were made once in a while when the thing was becoming a little more flagrant, I think it would receive a setback. All we need is the support of the members, and to ask them to set aside a little feeling of delicacy, and if they are making these complaints straightforwardly and not prompted by jealousies and wrong opinions, I think the Council will take it up and see them through.

Mr. Kirkpatrick—Mr. President, I agree heartily with what Mr. van Nostrand says as regards the idea of raising the fees to $200. It would simply be an act of suicide for this Association to attempt any such thing. It is perfectly true that in the first draft of the Association's Bill $50 was the amount that was put in, and Mr. Hardy stated that that, in the opinion of the Legislature, would almost defeat the Bill, and he recommended us in the interests of the Association to put it at $30, and stated that we might reasonably raise the preliminary examination to $10, which practically made the assessment $40, and then, as it has always been continued since, he promised us the Government would give $200 towards the expenses of the Association. It strikes me forcibly if any attempt was made to raise it to even $50 we would probably lose the $200 and not get any increase at all, besides, I quite agree with Mr. van Nostrand, I don't think that we want it. One gentleman said it would take all the surveyors in this room to do the work. Last night we heard we had too many surveyors. My opinion is, we haven't too many surveyors. There must be plenty of work in actual surveying, but nearly every man here is an engineer as well, and I think they will have plenty of work, and we ought not to be setting up to be what would be called too close a corporation. If we do we will find we will be something like the dog and his shadow.

As far as inspecting is concerned, I think it is all right, but I don't think that it is worded right. I think whoever inspects ought to be under the instructions of the Council, and he should not undertake of his own free will to go to work and investigate. I think the Council should hear from the Complainant first, and then if they see any clear case, they should employ this inspector, whoever he may be, and he would have to be an absolutely reliable man, a man that the Association would have the profoundest belief in, because he would have to be absolutely above suspicion in every way.

The President—That was my impression, that he should be under the guidance of the Council.

Mr. Griffin—Do the fees at present charged to the student much more than pay the costs of the examination ?

Mr. van Nostrand—Sometimes above and sometimes below.

The Secretary—This year thirteen passed, and I think the expenses of the examination were slightly more than the fees received.

Mr. Routly—Different members in our country have at different times spoken to members of the Council, and the members of the Council always say, Bring in your evidence. There is difficulty in procuring evidence in the first place, and the danger that a practitioner runs in presenting that evidence above his own signature. It is difficult to get a number of surveyors ; if we had four or five surveyors that could get together and get this information and all present this evidence, it might not make so much difference, but the difficulty is to get the evidence as individual members. The Council will apparently take no action unless there is sufficient evidence put before them to convict a man. Such evidence cannot be got by an individual member. I have not tried to do so, but I feel it would be difficult to get all the surveyors in the vicinity together on the question, and even if we did, it is very difficult to get the evidence, whereas if an inspector was appointed by the Association or Council, to whom individual members could refer confidentially, we could lay our information before him, but not be compelled to present evidence sufficient to convict in the court. I would move that the report of the Committee be adopted.

Mr. Griffin—It seems to me that it ought to be put in this way, that the Council would have authority to engage an inspector, and I would move in amendment that the rider be added to it that the Council hereby have authority to engage such inspector at such remuneration as they see fit. I think it would be well also to have an amendment that that $200 be changed to $50.

Mr. van Nostrand—The Council already have authority to use the funds of the Association for any such purpose as that, and any complaint would have to come before the Council anyway, so that I don't think we would be much farther ahead. I am not on the Council. It looks to me like a want of confidence in the Council.

Mr. Kirkpatrick—I think the majority are in favor of the latter part of the report, but I don't think they are in favor of the former part.

Mr. Beatty—I would move in amendment to the amendment that the whole report be referred to the Legislation Committee, and that they take action if they see fit.

Mr. Rorke—I second that motion.

Mr. Niven—We had better eliminate the second portion of the report and move the adoption of the first part.

Mr. Griffin moved in amendment to the amendment that the second clause of the report be adopted by the Association, and the first part stricken out.

Mr. van Nostrand—I rise to a point of order. I beg to move that the report be laid on the table.

Mr. Fawcett—I second that.

The President put the motion to lay the report on the table, which, on a vote having been taken, was declared carried.

Mr. Kirkpatrick read the report of the Council of Management and moved, seconded by Mr. Niven, that the report be adopted.

The President put the motion, which, on a vote having been taken, was declared carried.

The President called for the report of the Committee on Legislation.

Mr. Kirkpatrick—As regards the report of the Committee on Legislation, I am afraid I have not got any report. About two months ago I sent a notice to all the members and asked them if they had anything to suggest, and they all said no, beyond the suggestions that were made last year. These, of course, mean alterations in the Act, and we have been working on them ever since, but they are not exactly in the position yet to bring before the Minister with a view of getting them in this year, but if we can get them in we will. It is a knotty point, changing the Act, it takes such a long time to get it so worded that it will mean what it says. As far as we have got I think we do mean what we say. It has got to run the gauntlet of the Law Clerk of the Assembly, and perhaps when it gets out of his hands it will mean the opposite of what we intend. If we can get it in shape for bringing before the Minister with a view to getting it published this year, we will do so. It will just carry out what was passed last year. One thing was to change the date of meeting in the Surveyors' Act, and make it the second Tuesday instead of the fourth Tuesday in February; nearly all our dinners heretofore came on Ash Wednesday and this probably did keep several of our surveyors from attending the dinner, and by commencing on the second Tuesday in February we eliminate that danger.

Mr. van Nostrand—In the matter of changing the date of meeting, and consequently the date of the meeting of the Board of Examiners, it is a question whether it would not be a hardship to some of the articled pupils. A number have articled themselves leaving three months margin. If the board meeting were to occur a month earlier, that would be four months, and they would be thrown back a year. Could we have it made to come in operation say two years hence, so as to make these people secure?

Mr. Kirkpatrick—That arrangement was made at the last annual meeting. We will have to take the matter into consideration.

The President called for the report of the Auditors; which was presented and read by Mr. Wilkie, who moved, seconded by Mr. Ward, that it be adopted. The report was adopted.

The President called for Mr. James Dickson's paper on "A Few General Observations," which, in his absence, was read by Mr. van Nostrand.

Mr. Fawcett moved, seconded by Mr. Ward, that the paper be received and printed in the minutes, and the thanks of the Association tendered to Mr. Dickson. The motion was carried.

The President—The next paper is the "Autobiography of an Old Surveyor," by Mr. C. Unwin.

This paper was read by Mr. A. Unwin, Mr. Charles Unwin's nephew. The paper was received with applause.

The President called for the report of the Committee on Repository and Biography, by Mr. H. L. Esten.

Mr. Esten—I would move that that report be accepted as read, and printed in the proceedings just the same as if I had presented it. I will hand it in to Captain Gamble later on.

Mr. van Nostrand seconded the motion. The motion was carried.

5.15 p.m., adjourned to meet on Thursday, March 10th, at 10.30 a.m.

MORNING SESSION, THURSDAY, MARCH 10TH, 1910.

At 10.30 a.m. the President took the chair and called the meeting to order, and requested Mr. Ross to read Mr. Owen McKay's paper, entitled "A Concrete Box Sewer."

Mr. Ross then read the paper and moved, seconded by Mr. Selby, that the paper be received and printed in the Minutes, and that the thanks of the Association be tendered to Mr. McKay. The motion was carried.

Mr. van Nostrand moved, seconded by Mr. Ross, that in the absence of Mr. Chipman, the report of the Committee on Polar Research be taken as read, and printed in the proceedings. The motion was carried.

The Secretary moved, seconded by Mr. Wilkie, that the report of the Committee on Entertainment, owing to Mr. Whitson's absence, be taken as read and printed in the proceedings. The motion was carried.

At this point a recess of ten minutes was taken, after which the Election of Officers was proceeded with.

The President—We will now proceed with the nomination of officers. I will take nominations for the office of President first.

Mr. van Nostrand—I have pleasure in nominating Mr. H. W. Selby for the office of President.

Mr. Fawcett—I second that.

There being no further nominations the President put the motion, which, on a vote having been taken, was carried, and Mr. H. W. Selby declared elected to the office of President for the ensuing year.

The President—We will now take nominations for the office of Vice-President.

Mr. Niven—I beg to nominate Mr. J. F. Whitson as Vice-President for the ensuing year.

Mr. Ross—I beg to second that.

Mr. Browne—I beg to nominate Mr. Wilkie.

Mr. Wilkie—Mr. President, I think I will ask Mr. Browne to withdraw his nomination. I thank him for the nomination, but I think it would be as well to withdraw it at the present time.

Mr. Browne—If Mr. Wilkie wishes it, I withdraw my nomination.

There being no further nominations, the President put the motion, which, on a vote having been taken was carried, and Mr. J. F. Whitson declared elected to the office of Vice-President for the ensuing year.

The President called for nominations for the office of Secretary-Treasurer.

Mr. Browne—I beg to nominate Captain Gamble.

Mr. Ross—I second that.

There being no further nominations, the President put the motion, which, on a vote having been taken, was carried, and Captain Gamble declared elected to the office of Secretary-Treasurer for the ensuing year.

The President called for nominations for the office of two auditors.

Mr. van Nostrand—I beg to nominate Mr. E. T. Wilkie and H. J. Beatty. My reason for nominating these gentlemen from abroad is that they will be a check on this little ring here in Toronto, and will see that things are done properly.

Mr. Rorke—Mr. Beatty is on the Council. Is he eligible as an auditor ?

Mr. Beatty—I think the auditors should reside in the city, so that I think Mr. van Nostrand should withdraw my name.

Mr. van Nostrand—I withdraw the second nomination.

Mr. Ross—I nominate Mr. H. L. Esten as auditor.

Mr. Fawcett—I second the nomination of Mr. Wilkie and Mr. Esten as auditors.

There being no further nominations, the President put the motion, which, on a vote having been taken, was carried, and Mr. E. T. Wilkie and Mr. H. L. Esten declared elected to the office of auditors for the ensuing year.

The President called for nominations for the election of two members to the Council, and stated that the retiring members were Mr. Gibson and Mr. Murphy.

Mr. Niven—I beg to nominate Mr. Gibson for the Council for the next term.

Mr. Beatty—I have much pleasure in nominating Mr. C. H. Fullerton. I may say I think it is only fair that Northern Ontario should have some representation on the Council. The district in which Mr. Fullerton resides is a district in which a great amount of surveying is being done, a large number of surveyors reside there, and I think they should be represented.

Mr. Ross — I will nominate Mr. Wilkie.

The President — He is an Auditor.

Mr. Ross — That won't disqualify him.

Mr. Browne — I beg to nominate Mr. C. J. Murphy.

Mr. Routly — I have much pleasure in nominating Mr. J. M. Watson.

Mr. Rorke — I nominate Mr. James Hutcheon, of Guelph.

The President appointed as scrutineers Messrs. W. A. McLean and J. F. Whitson.

Unfinished Business.

Mr. Wilkie — I beg to move, seconded by Mr. George Ross, that the Association grant the Secretary-Treasurer $325 as a slight recognition of his services during the past year. You will notice we have made an increase of $25. We took it upon ourselves to do so for the reason that we understand the Secretary is put to considerable extra expense in connection with the annual dinner, and we thought that perhaps it was not quite fair that the Secretary should have to put up from his own pocket or out of his grant, which is small enough, this extra expense for our pleasure.

The President put the motion, which, on a vote having been taken, was declared carried.

Mr. Pearce moved, seconded by Mr. Phillips, that the sum of $5 be granted to each of the auditors.

The President put the motion, which, on a vote having been taken, was declared carried.

Mr. Niven moved, seconded by Mr. Beatty, that we express to the President and Members of the Engineers' Club our appreciation of the honor done the members of the Ontario Land Surveyors Association in extending to them the privileges of the Club during their attendance at the annual meeting of the Association.

The President put the motion, which, on a vote having been taken, was declared carried.

Mr. van Nostrand moved, seconded by Captain Gamble, and resolved, that this Association has learned with deep regret of the death of three of the original members of the Association, W. R. Aylsworth, Thomas Byrne, and Joseph Doupe, and that the Secretary be requested to convey to the immediate families of the deceased our expression of deepest sympathy for them in their bereavement.

The President put the motion, which, on a vote having been taken, was declared carried.

Mr. Routly — While I have not a motion to put, I would like to bring to the attention of the Association a suggestion I would like to make to the Council. It is in connection with the office of the Secretary. I believe there has been some discussion towards the end of having him secure quarters of his own, and my suggestion is this, that as the

Association is in a flourishing condition and could stand a slight expenditure, if it turned out to be that way, that the Secretary be empowered by the Council to employ an assistant, so that surveyors from outlying points wanting plans and descriptions and information of one kind or another, could send to our own Secretary and feel the matter would be looked into at once, and that he would get his information with the greatest dispatch possible. I have always found the Department itself ready to send me any description or plans I asked for, but very often they are very busy, and usually when you want something up north you want it quickly. I had sent ten days before I came down for a small plan I wanted, and when I left it hadn't come, and I presume it was because the staff was busy in the Department. As a rule they come promptly. I have found, however, that in order to get what you want and get it quickly, so as not to impose on the Department too much, I have to employ an agent here to do that kind of work for me. I don't know exactly what it has cost, but I know it has cost well on to $100 a year. I think if we had an assistant to the Secretary — I don't know exactly what it would cost, $60 a month probably — we could pretty nearly keep him busy, and the fees which he would collect in place of the individual agents, or the fees which we turn in to the Department would pay the greater part of his salary, and it might possibly be a source of revenue to the Association. He could also do something else for us that would be a great deal of help if he were to establish an up-to-date employment bureau, so that he would keep in touch with the various members of the Association, so that if we required the assistance of a brother in the profession he would know just about who to send us and who to recommend, and he would also probably have a list of transit men that would be available on short notice ; and I feel in many ways if we had a permanently paid official who was paid a sufficient salary so that we could demand all his time, he could be of a great deal of assistance to us, especially to members living outside of the City of Toronto. As it is now, it is a great deal of expense, and it is not altogether the expense, but it is the fact that when we send for something we want it quickly and want to be sure we get it. This is merely a suggestion.

Mr. Rorke — As far as the Department is concerned, I think they generally try to get things out as quickly as possible to the outlying surveyors, but they are very busy up there, and every order that comes in has to take its turn in the usual routine, and for that reason it is often very late when the information gets back.

Mr. Beatty — There is one objection I see to the Council employing anyone, or giving anyone an official position, in that when you ask for notes from the Department, or for copies of plans, it is usually of some assistance to have them certify it is correct, and have it come from the Government really as an official document. They usually initial them, and they are looked upon then as a copy of the original notes. If you want a copy of the records in the Department, they and they alone are the people to furnish them, and if anyone wants anything in a hurry he could easily arrange himself to get it.

Mr. Watson — A copy would not stand in court the same as an original.

Mr. Beatty — I think a copy of field notes received from the Department, which are usually stamped by the Department, would be accepted as evidence.

Mr. Rorke — A certified copy would be accepted.

Mr. Beatty — Certainly, otherwise it would be of no use to you.

Mr. Routly — As a rule it is not a certified copy we want ; it is just simply information. We generally employ an agent outside, sometimes a clerk in the Department, to do it overtime, or sometimes someone outside, on account of the Department being frequently rushed with work, and they cannot give us the information as quickly as we want it, for instance, the field notes of various townships are very often required merely for information.

Mr. Wilkie — Perhaps my experience has been somewhat limited along that line, but I have invariably found when I wanted plans or field notes they were useless unless they were stamped and had the authority of the Department. A certified copy of field notes or plans can be used in court or anywhere, and unless you are sure you have absolutely got that, you are unsafe in making a survey from it. While in some respects the suggestion by Mr. Routly is very good, yet with regard to information from the Department it is much better, even though you do have to wait a few days for it, to get something that is reliable, that you can depend upon, that you can use where and how you may require to.

Mr. Niven — The only way I see, Mr. President, to accomplish that, would be for each person to have someone here to copy the notes, and then get them certified by the Department, otherwise they are of no use; at least they wouldn't be held to be authentic in court. The Department will always certify to anything that is copied, providing it is compared by some of their own officials. I don't think the Association should go into that business. At all events, the matter has been brought up here now, and we will discuss it in the next Council meeting and see what can be done.

Mr. van Nostrand — If there is nothing before the chair I would like unofficially to ask for a little advice about the arrangement of the programme, and the conduct of the meeting, in order to get a little nearer to it than we have done in the past. For years we have been struggling with this programme and spending a good deal of time and thought on it. I was one of a committee that spent four or five hours on this one. We thought we had it nicely arranged, with all the cardinal principles adhered to. About two-thirds of the work is in the first two sessions to allow for those who are a little behind hand with their papers and reports and that sort of thing. What happened first was that we ran out of material about the middle of the afternoon of the first session. In the evening we got sidetracked on something else and didn't get through with our programme, and then we have been plodding along in a hit-or-miss sort of way; and those who came to hear certain things and had only perhaps time to attend one session, found those certain things had come on before, or would not come on until later, or would not come on at all for the lack of time. If there is anyone here who could give any suggestion to those who have the burden of preparing that programme and to those who have to do with the conduct of the meeting, I think it would be very welcome.

Mr. Chase — Might I make a suggestion, that those papers, which may be entertaining, might be left off the actual programme and more time devoted to discussion of matters of vital interest to the Association, such as the reports of the Committees on Surveying and Drainage, and matters of that description.

Mr. van Nostrand — I am afraid that wouldn't help us out of our difficulty, because we haven't spent very much time on papers that were not technical, and have missed some that were technical.

Mr. Chase — I might go further and suggest that the papers might be received and printed, and the whole time spent in discussing matters of interest to the Association. There were one or two meetings that were highly instructive and entertaining, but there was no discussion on matters that were left over. For instance, I understand there has been no discussion on the question of drainage.

Mr. van Nostrand — It is very disappointing, and we would like to see some way out of the difficulty. There are papers here that we have not had at all, that would have been very interesting, useful and instructive, and would have provoked a lot of discussion that would have added very much to their value. We have not had them. The custom has always been to bring in the least important papers and reports in the beginning of an afternoon or morning meeting before the attendance is large, and save the more important ones until the attendance is in full. But in doing that we have to depart from the programme. Then the discussions are sometimes prolonged, and sometimes they are very short ; you have to guess at all your data, and it comes out very unsatisfactory in the end.

The President — How would it do to appoint a committee, say, of three, to look over the programme, and let them suggest what should be taken as read, and what should be read and discussed ?

Mr. Chase — Possibly it might be somewhat the fault of the Committee not getting together when they are here. Nearly all the Chairmen of Committees complained of not being able to get into communication with the various members of those Committees. Why not spend some of the time here in committee work ?

Mr. van Nostrand — We try to meet that point by setting apart the morning of the first day for the meeting of the Council of Management, and of Standing and Special Committees, but it has nearly always been a failure ; we seldom get a quorum. I don't know what other session we could set apart for that purpose.

Mr. Niven — Mr. President, we had a discussion yesterday on the report of the Special Committee appointed regarding matters in the North, and I scarcely know how the matter rested. I think the report was laid on the table, and it remains there yet. But there is no doubt that there is a grievance up there, and in fact, indeed, all over the Province, about unlicensed persons practising surveying, and

Mr. Kirkpatrick expressed the opinion here that the Council had power now to deal with those things. Now that the matter has been discussed I think that the Council will take the matter up and do all that lies in their power, but what should be done by the parties who know of those irregularities is to furnish us with the proof as far as they can to give us something to go upon, and so far as I am concerned I will do what I can to have the offenders prosecuted. In the North Country I have heard of one who is well known as an unlicensed practitioner, and something should be really done to stop his methods of procedure. I don't know that it is necessary to mention any names, but if anyone who knows of these irregularities will give us the information, I promise, so far as I am concerned as a member of the Council, I will give it my best consideration and we will do what we think is in the interests of the surveyors generally. (Applause).

Mr. Tyrrell — I think, Mr. Chairman, no doubt there is a difficulty in connection with that question from the surveyor's private point of view, apart from any action the Council may take. Few of us would care to act the part of a private detective going about to collect evidence such as might be necessary to convict a man. I know personally of at least two cases of unlicensed practitioners in my own part of the country, and I have been asked frequently, Why don't you prosecute them ? I am not going to prosecute them ; I am not going to start out as a private detective and collect the evidence necessary. If we had someone to take action upon receiving the hint, I think it would be a great step towards getting over the difficulty.

Mr. Watson -- I think Mr. Tyrrell hits the crux of the question.

Mr. Beatty — Don't you think the Council should be supplied with sufficient information, or with the word of the surveyor, or something to go on ? A mere hint would not justify the Council in taking action. Where there are cases similar to what you mention there is no doubt whatever that the Council will assist the surveyors in every way in their power, but I think we should have some definite evidence. If the practice of surveying by non-licensed men is very prevalent, it would be an easy matter for some surveyor directly interested to write a private letter to some member of the Council, and in that private letter he could give him an assurance that there would be no difficulty in obtaining a conviction. As a member of the Council, if any surveyor complained to me in that matter, I would report to the Council, and from the opinions I have heard expressed by other members of the Council I have no doubt that they would take action.

Mr. Tyrrell — Upon receiving information from some surveyor concerning an unlicensed practitioner, if the Council would then assume the responsibility of appointing a special agent or private detective to look up the necessary information or evidence I think it would be all right, but I don't think any surveyor, or comparatively few surveyors, are going to act the part themselves of detectives and obtain the proofs and so on. I know, for my part, I wouldn't.

Mr. Beatty — I don't think any surveyor should be called on to supply the evidence. I think that is a matter that the Council should obtain for themselves. They should appoint someone. All the Council would want is the assurance that the party complained of is practising surveying when he should not, and then certainly I think the Council should obtain the evidence necessary to obtain the conviction.

The Secretary — I think a private detective would not be able to go up into a place like Gowganda and follow the steps of these unlicensed practitioners without going to great expense.

Mr. Beatty — I am satisfied in the Gowganda country there would be no difficulty for someone to go up there and obtain the information, and without very much expense, and I think if you made one example you would stop it.

Mr. Selby — I don't think there should be very much difficulty about that, Mr. President. It seems to me if a matter is reported to the Council and they are satisfied that there is a case there, and they send a detective to go into the question, the surveyor who is most interested will certainly furnish all the evidence that will be necessary without bringing himself into the argument, or into what might be called the detective business at all.

The President — As far as I can see, I don't think there is any difficulty in the matter at all as it is. The surveyor knowing of any of these circumstances, it is not much trouble for him to learn who this man is, and whom he has been surveying for, and the particulars, without making himself known at all. If he would write down to any member of the Council and give the names and circumstances and where any person that was sent by the Council could find out the particulars, that person could report to the Council and the Council could take action. I don't think there is any difficulty as it is, without appointing a detective. If the surveyor who knows of the circumstances gives the details, and assures the Council there will be no difficulty in prosecuting the party, the Council should be willing to proceed with the prosecution at once.

Mr. Griffin — I supported the resolution yesterday which was laid on the table, but now I feel perfectly satisfied that there is no necessity for anything more being done. I did not know whether the Council had power, or whether it was necessary for the Association to give them some additional authority, but after the explanation from the members of the Council who are here, I feel quite satisfied to leave the matter as it is, and am sure that the Council, if any complaint is made, will deal with the matter as they think best, employing some person if necessary.

Mr. Niven — If there is no other business to come before the meeting, I would move, Mr. President, that you do now leave the chair, and that Mr. Selby take it.

Mr. van Nostrand seconded the motion, which was put to the meeting, and carried.

The President left the chair, and Mr. Selby took the same.

Mr. Niven — I move now, Mr. Chairman, that a vote of thanks be given to the retiring President for the manner in which he has conducted the business of the Association during the past year, and during the present meeting.

Mr. Fullerton — I have very much pleasure in seconding that motion. The retiring President is the first Ontario Land Surveyor I ever saw. I remember when a boy about ten or twelve years of age my mother asked me what I expected to be when I grew up, and I said I expected to be an Ontario Land Surveyor, and I hoped to be one like Mr. Bolton. I am an Ontario Land Surveyor, and I only hope I shall succeed in being one like Mr. Bolton. I have very much pleasure, therefore, in seconding the motion.

Mr. Fawcett — Mr. Bolton is my old chief ; I served my time with Mr. Bolton and with Mr. Heaman. I have ever since thought a great deal of Mr. Bolton. He is one of those quiet men that do not say much, but you can always depend upon Mr. Bolton, and I wish to pay my tribute to him as a professional man, and as a man in every respect, and a gentleman.

The Chairman put the motion, which, on a vote having been taken, was declared carried, with applause.

Mr. Selby — Mr. Bolton, I have great pleasure in extending the vote of thanks of the Association to you for the manner in which you have conducted the proceedings of this Association. (Applause).

Mr. Bolton — Gentlemen, I appreciate your expression of thanks. When I took this position I did so, feeling that I was hardly able for the occasion, but I did the best I could, and I have this to say about the members of the Association, I thank them very heartily for the assistance they have given me in keeping the matters which were of interest before the Association during the session. I must say that the task was somewhat easier than I expected, and I appreciate this expression. I thank you, gentlemen. (Applause).

Mr. Selby here left the chair and the President resumed the same.

Mr. van Nostrand — If there is no further business to come before the Association, I move the adjournment.

Mr. Niven — I beg to second this motion.

The President put the motion, which, on a vote having been taken, was declared carried, and the meeting adjourned at 12.15 p.m.

PRESIDENT'S ADDRESS.

To the Members of the Association of Ontario Land Surveyors:

Gentlemen :—I have much pleasure in opening this our Eighteenth Annual Convention of the Ontario Land Surveyors. I wish to express my sincere thanks to you for the honor which you have conferred on me, in thus placing me in the chair. I may say that I feel unable to fill the position as it should be, considering its importance.

I will not take up your time with any lengthy remarks, but looking over our programme, I find a goodly number of subjects in the hands of those of whom we have no doubt as to the interesting and valuable information that they will give the members of this Association. There are several subjects that come up for discussion at each of our meetings, no doubt they will be heard on the present occasion, viz., — Tariff of fees, Amendments to the Survey and Drainage Acts, etc.

I am pleased to note that our finances are in a healthy state notwithstanding the impurity of the City water.

At our meeting in the year 1889, it was moved by Mr. Stewart, seconded by Mr. Ogilvie, that the President and Messrs. Proudfoot, Abrey, McAree and the mover be a committee to urge upon the Ontario Government the desirability of carrying out in connection with the Surveys Branch of the Crown Land Department, a system of Exploratory Surveys in our new territory. I wish to draw your attention to the rapid development of our country, that was brought on by that movement of our Association. We do not realize the benefit that we as Surveyors have been to the Province, and to the world at large, in the development of our northern lands and mines.

We regret very much to find that some of our worthy associates have departed this life during the past year, and a number of us bearing the frosts of time may expect to follow them at no distant date.

During the past year there has been considerable excitement and controversy as to the discovery of the North Pole. In my opinion the search has been a great waste of time and money. It has been known for a number of years that around the Pole is nothing but a sea of ice moving eastward, and it matters little or nothing as to the exact point where the Pole is situated, or as to whether the Union Jack or the Stars and Stripes is flying at that point.

For a moment take a look backwards, and see how much our Northern Country, yes, and our Northwestern Country, have opened up in the last ten years, adding greatly to our revenue. Gentlemen, we cannot but conclude that we have the richest country in the world, and we are led to exclaim, where shall we be in the next twenty years ?

I ask the members of this Association to assist me in conducting the proceedings of our meeting, keeping up an interest in the matters before the Association.

REPORTS.

SECRETARY-TREASURER'S REPORT.

Mr. Chairman,—I have the honor to lay before you the report of the official business of the Association transacted by me between the 23rd February, 1909, and the 5th March, 1910. The "Papers" that had been read and the minutes of our Annual Meeting were revised, and prepared for publication as early as possible.

We sent copies of our Reports to the following societies:

School Practical Science, Engineering Society	150 copies
Michigan Engineering Society	200 copies
Ohio Society, Surveyors and Civil Engineers	200 copies
Illinois Society, Engineers and Surveyors	180 copies
Indiana Engineers' Society	130 copies
Iowa Civil Engineers' & Surveyors' Society	120 copies

And copies of the Reports we received from them were sent to all our members who were not in arrears with the Association.

The Ohio Society of Surveyors and Civil Engineers have withdrawn from our Exchange List.

During the year nine new members were received into the Association, three active members have had their names placed on the withdrawn list, and we have to regret the loss by death of the following :—Messrs. W. R. Aylesworth, Jos. Doupe and Thomas Byrne.

Our Department of Repository and Biography seems to continue in abeyance, and we are urgently in need of an office and library, as our present quarters are quite untenable.

Our thanks are due to the various departments through whom we have regularly received the Annual Reports of the United States Coast and Geodetic Survey, the Geological Survey of Canada, the Dominion Archives, and the Ontario reports of the Bureau of Mines, and the Bureaus of Industry and Forestry.

The financial statement accompanying this report shows the favorable condition of our affairs.

In conclusion, I wish to give my warmest thanks to the members of the Association for their forbearance toward me and for the help they have given me in the fulfillment of my duties.

Respectfully submitted,

KILLALY GAMBLE,

Secretary-Treasurer.

Confirmed subject to approval by Auditors.

GEO. B. KIRKPATRICK,

Chairman of Council.

STATEMENT OF BALANCES, RECEIPTS AND EXPENDITURES BETWEEN THE 23RD FEBRUARY, 1909, AND THE 5TH MARCH, 1910.

Dr.

To Balance in Savings Account, 23rd Feb., 1909	$2,038.35
“ Balance in Current Account, 23rd Feb., 1909...	1,323.91
“ Receipts in Board of Examiners' Account, including Government Grant of $200 and regular fees	1,344.25
“ Annual fees, including Associate fees	846.15
“ Amount collected from Advertisements, etc.	62.00
“ Accrued interest in Savings Account	61.55
	$5,676.21

Cr.

By Amount for publishing Proceedings, 1909-10 ...	$ 475.85
“ Amount granted to Secretary-Treasurer	300.00
“ Amount paid for Postage and Express	75.00
“ Amount paid for Printing and Stationery	65.75
“ Stenographer for reporting Annual Meeting...	50.00
“ Armour & Mickle, Solicitors	40.27
“ Amount granted to Auditors	10.00
“ Marking Standard Tapes	16.00
“ Freight, Cartage, Brokerage and Sundries	9.01
“ Premium on Secretary's Bond	7.50
“ Lewis Bolton, $6.75, and Herbert Beatty, $21.05, Council meeting	27.80
	$1,077.18
“ Amount of Disbursements in Board of Examiners Account	$ 647.45
“ Balance in Savings Account	2,099.90
“ Balance in Current Account	1,851.68
	$5,676.21

KILLALY GAMBLE,
Secretary-Treasurer.

REPORT OF AUDITORS.

We hereby certify that we have examined the Secretary-Treasurer's books and accounts, and we find them correct, and that there is a balance of $2,099.90 in the savings account, and $1,851.68 in the current account.

We find no account of the Outstanding Assets of the Association, which we are unable to obtain, and we think that this item should be included in future statements.

We find that the Register is antiquated, and would suggest that a modern loose leaf system be adopted.

E. T. WILKIE,

A. T. WARD,

Auditors.

REPORT OF THE COUNCIL OF MANAGEMENT FOR THE YEAR 1909.

The Council begs to report to the Association of the Ontario Land Surveyors that it has held three meetings since the last meeting of the Association, one on the 20th April, 1909, one on the 18th February, 1910, and the other on the 8th March, 1910.

At the meeting of the 20th April, 1909, Mr. George B. Kirkpatrick was appointed Chairman of Council for the ensuing year. The names of the members of the Standing and Special Committees were approved.

The proposed changes in the Survey Act were discussed, and were left in the hands of the Chairman and Secretary to take action thereon.

A form of agreement between surveyors and their employees was ordered to be submitted to Mr. E. Douglas Armour for his legal opinion, and that a thousand copies of it shall be printed for the use of surveyors, after obtaining his opinion.

Messrs. Thomas Fawcett and T. B. Speight were appointed members of the Board of Examiners for the term ending April, 1912.

By-law No. 50 was passed making the remuneration of the members of the Board of Examiners $8.00 per day for each member, together with expenses incurred when attending the Board.

The law regarding the obstruction of surveyors in the execution of their duties was discussed, and it was decided to leave the matter for the present in the hands of the Solicitor, who is drawing the attention of the Minister of Justice to it.

The Council has to regret the loss of three members of the Association by death since the last meeting, namely: William Robert Aylesworth, Belleville, Ont.; Thomas Byrne, Sault Ste. Marie, Ont., and Joseph Doupe, Winnipeg, Man.

Respectfully submitted,

GEO. B. KIRKPATRICK,
Chairman of Council.

REPORT OF COMMITTEE ON PUBLICATION.

After preparing the papers for publication and reviewing the minutes of the meeting as reported by our stenographer, and also having got ready the necessary diagrams for illustrating papers and reports, your Committee placed the publication of the Annual Report in the hands of the Stevenson Printing Co., who carried it out very satisfactorily. 1350 copies were printed and distributed amongst the Societies who exchange reports with us, amongst the various scientific bodies and libraries we correspond with, and amongst our members. I regret that we have not more time to expend in canvassing for advertisements for our Report.

KILLALY GAMBLE,
Chairman.

REPORT OF BOARD OF EXAMINERS OF ONTARIO LAND SURVEYORS, 1909-10.

An adjourned meeting of the Board of Examiners was held in the Board Room, Department of Lands, Forests and Mines, on Monday, the 19th April, 1909, in pursuance of a resolution passed on the 16th February, 1909.

The following candidates passed the required Final Examination :—

Frank Elliott Patterson, Sudbury, Ont.
Francis Merwin Eagleson, Winchester, Ont.
Kenneth George Ross, Toronto, Ont.
Tracy Deavin LeMay, Toronto, Ont.
George Samuel Jones, Smith's Falls, Ont.
Albert Victor Chase, Orillia, Ont.
Sydney Edward Farley, Ottawa, Ont.
Alexander Hunter Greenlees, London, Ont.

Their certificates to bear date as follows : Messrs. Chase, Patterson, Jones, Greenlees and Farley, April 21st, 1909 ; LeMay, 1st May, 1909 ; Eagleson, 11th May, 1909 ; Ross, 15th May, 1909.

The Board met in the Board Room on Monday, 14th February, 1910, and the following candidates passed the required Preliminary Examination :—

William Sinclair Jardine, Toronto, Ont.
Frederick James King Benner, Cobalt, Ont.
John Benedictus Hellferth, Toronto, Ont.
Richard Ford Dynes, Toronto, Ont.
John Cecil Wilde, Sault Ste. Marie, Ont.

The following candidates passed the required Final Examination :—

William Albert McMichael Cook, Toronto, Ont.
William James Johnston, St. Catharines, Ont.
John van Nostrand, Toronto, Ont.
Frederick John Anderson, Niagara Falls, Ont.
Lionel Douglas Noble Stewart, Collingwood, Ont.
Alexander Stuart Campbell, Kingston, Ont.
Horace Joseph Peckover, Toronto, Ont.
Norman Douglas Wilson, Toronto, Ont.
Henry Percy Argall Phillips, Toronto, Ont.
Hubert Orville Dempster, Gananoque, Ont.
Roger Melville Lee, Hamilton, Ont.
Thomas Henry Byrne, Ottawa, Ont.
Marcel Pequegnat, Berlin, Ont.

The following surveyors were duly sworn in :—

John Wesley Pierce, 20th February, 1909.
Mason Herman Baker, 16th February, 1909.
Charles Ross McColl, 4th May, 1909.
Francis M. Eagleson, 21st April, 1909.

Kenneth G. Ross, 21st April, 1909.
Tracy D. LeMay, 21st April, 1909.
George S. Jones, 21st April, 1909.
Albert V. Chase, 21st April, 1909.
Sydney E. Farley, 21st April, 1909.
Alexander H. Greenlees, 21st April, 1909.
Norman D. Wilson, 24th February, 1910.
Marcel Pequegnat, 24th February, 1910.
Thomas H. Byrne, 24th February, 1910.
Horace J. Peckover, 24th February, 1910.
Henry P. A. Phillips, 24th February, 1910.
Roger M. Lee, 24th February, 1910.
Alexander S. Campbell, 24th February, 1910.
Hubert O. Dempster, 24th February, 1910.
Frank E. Patterson, 21st April, 1909.

The following articles were filed by the undernamed pupils during the year :—

Name of Pupil	Name of Surveyor	Residence	Date of Articles	Terms
Keys, H. R	J. L. Lang	Sault Ste. Marie	Jan. 25, 1909	3 years
McConkey, J. C	J. Hutcheon	Guelph	Feb. 8, 1909	1 year
Blandy, O. R	J. J. MacKay	Guelph	Feb. 13, 1909	3 years
Gourlay, R. M	F. F. Clarke	Toronto	Feb. 13, 1909	3 years
Adams, F. P	J. H. Jones	Brantford	Feb. 16, 1909	3 years
Lowe, F. C	DeMorest & Stull	Sudbury	Feb. 16, 1909	3 years
Gill, J. R	DeMorest & Stull	Sudbury	Feb. 16, 1909	3 years
Burner, F. A	R. S. Code	Cobalt	Feb. 28, 1910	3 years
Cook, W. A. M	Alex. Niven	Haliburton	April 13, 1909	1 year
Bell, F. A	J. A. Bell	St. Thomas	April 28, 1909	1 year
van Nostrand, John	Speight & van Nostrand	Toronto	May 1, 1909	1 year
Anderson, F. J	H. W. Sutcliffe	New Liskeard	May 1, 1909	1 year
Brown, J. A	J. F. Summers	Gowganda	May 1, 1909	1 year
Johnston, W. J	J. W. Neelands	New Liskeard	May 10, 1909	1 year
Jackson, J. E	W. A. Fairchild	Brantford	May 12, 1909	1 year
Webster, W. G	W. H. Fairchild	Brantford	June 1, 1909	3 years
Malcolmson, W. S	H. T. Routly	Haileybury	July 1, 1909	1 year
Niven, D. A	G. Ross	Welland	July 15, 1909	3 years
Swan, M. G.	F. F. Clarke	Toronto	July 28, 1909	1 year
Slater, N. J	J. B. Lewis	Ottawa	Sept. 29, 1909	1 year

The following bonds have been approved and filed with the Provincial Treasurer in accordance with the Revised Statutes of Ontario, 1897, chapter 180, section 36, sub-section 2 :—

A. G. Ardagh,
Frank E. Patterson,
Sydney E. Farley,
Albert V. Chase,
A. H. Greenlees,
G. S. Jones,

J. W. Pierce,
Francis M. Eagleson,
J. R. McColl,
Kenneth G. Ross,
Henry P. A. Phillips,
Norman D. Wilson,
Horace J. Peckover.

Respectfully submitted,

GEO. B. KIRKPATRICK,
Chairman of Board.

DISCUSSION.

Mr. Aylesworth—I would like to ask the Chairman of the Examination Board how many pupils that totals to for this spring season ?

Mr. Kirkpatrick—Nineteen.

Mr. Aylesworth—How many passed the final examination ?

Mr. Kirkpatrick—Twenty-one.

Mr. Aylesworth—Will there be any more examinations this year ?

Mr. Kirkpatrick—An adjourned examination for about half a dozen finals.

Mr. Aylesworth—That will make twenty-seven ?

Mr. Kirkpatrick—If they all get through.

Mr. Sewell—It is moved by myself, seconded by Mr. C. J. Murphy, that the fees for the final examination of the Ontario Land Surveyors be raised to $200.

Mr. Fawcett—Wouldn't that motion require notice beforehand ?

The President—That is what I was thinking.

Mr. Wilkie—Wouldn't it be well to dispose of this report first ?

The President put the motion to adopt the report, which, on a vote having been taken, was declared carried.

Mr. Kirkpatrick—I don't think this Association has any power to change the fees. It is by Act of Parliament $30. You must get an Act of Parliament to change it.

The President—That is my impression.

Mr. Kirkpatrick—I don't think the motion is in order. The change would have to come through the Committee on Legislation, and it would have to be referred to the House afterwards. Then we would have to ask permission to spend the money. We can now only spend in real estate to the extent of $5,000. Then we would have ten or twenty thousand dollars and we would have to get an Act of Parliament to allow us to spend it.

Mr. Aylesworth—It seems to me that the drift of that motion is along the lines of the object I had for asking this question. It seems to me that a final examination with nineteen Ontario Land Surveyors blossoming out into manhood in one year is pretty rapid movement. I don't think there is any shortage of surveyors in the Province of Ontario, and it seems to me they are being admitted to practise at a very rapid rate. I don't know what all these young men are going to do. It seems to be the same way with the Dominion Land Surveyors ; they seem to be passed very rapidly and are urged to go into the profession. I heard one of the Dominion Land Surveyors gave an interview in Halifax the other day, in which he said that more Dominion Land Surveyors were required every day ; but so far as my observation goes, I don't see where they are required. I don't see why encouragement should be held out to them to adopt this profession. There is not going to be nearly so much land to survey in the Northwest in the future as there is now, and it is going to be in a very difficult country. I suppose the surveys in Ontario are of the same class—further north, and more difficult all the time, so that smaller surveys will be undertaken, and I don't see why men should be encouraged to adopt this profession and go through at the rate of probably 25 in one examination in one year. It seems to me that the resolution, if it can be passed, is something along the lines which I have in mind. The idea behind it is correct. Whether it will carry or not I don't know, but it seems to me some more stringent regulations ought to be adopted, or the examination made higher or something.

The President—My impression is that the motion is out of order. I don't think the Association has power. I think Mr. Kirkpatrick is right in that matter. I think that had better be laid over or withdrawn.

Mr. Sewell—It should go on to the Legislation Committee, and they can deal with it.

Mr. Kirkpatrick—The members will remember that two or three years ago Captain Deville tried to bring in a clause in the Dominion Land Act to provide that all surveyors in the world, principally those from Australia and New Zealand and the Cape should be admitted, because he said he couldn't get any surveyors to survey in the Northwest. That was only two or three years ago. We protested against it ; we didn't see why Ontario Land Surveyors should be shoved out in the cold and all these other men received with open arms. It didn't pass, but I know that I as Chairman of the Council wrote to the Members of the Senate, the Hon. J. K. Kerr, the Hon. G. W. Ross and the Hon. Mr. Jaffray, all the Toronto Senators, to oppose it, and it was thrown out. It was a very serious thing. The idea in Captain Deville's mind was to get surveyors, and now some of you are complaining that there are too many.

Many of these men that pass as Ontario Land Surveyors don't follow that profession ; they generally go into engineering. Many take up surveying who have passed in the School of Practical Science. You notice this time how many one year men there were, nearly all those men are taking up engineering, and there are not many of them who follow surveying entirely as a profession. I fancy that Gowganda and New Liskeard and a few other places can take more surveyors, because the surveyors up there have got so much to do, and I am sorry to say some of them are employing men who are not even students, and we have had to write very strong letters to say that only surveyors can be allowed to practise. Now, we are going to make the supervision absolutely personal supervision, and if they do not obey orders we will send them back their surveys. We have had a good deal of trouble lately in the Department about that — men making surveys, and surveyors certifying to them when they were not on the ground, and another surveyor comes on and he finds their lines fifteen or twenty degrees out. In such cases we have sent all the plans back. Then the question comes up, who is right ? Then it is found some young man who is not even a student was sent out by the surveyor and the surveyor signed the plan! This is a very unpleasant thing to say, but it is the fact. I do not think myself we have too many surveyors just now in the Dominion of Canada. We know there are a lot of men surveying up in the west, and they say they cannot do the work, they have got so much to do. Any man in Ontario who has not much to do can go to Gowganda now, or if he wants to start in a new place let him go to Fort Temagami ; up there is the place for any young man to go.

The Secretary—One thing that strikes me forcibly is the unfortunate fact that apprentices who are articled for one or three years often cannot pass their final examination on the Act. We used to consider in olden days when we as surveyors were paid a fee that we were responsible to see that our apprentices were taught the Act, now the surveyor, instead of getting a fee from these young men, employs them as workmen and pays them big wages, and he does not take any trouble about their education, the result is they come up for examination and know nothing of what is in the Survey Act, and they compete with graduates of the University who have only had an opportunity for twelve months of studying this Act, and yet know it better than they do. I think this is a grievous thing. The surveyors who employ these young men ought to insist on getting a fee and should teach these young men so that when they come up for examination they will not be plucked.

Mr. Aylesworth—I understood that quite a number of the pupils mentioned were three year men ; I thought over half of them ?

Mr. Kirkpatrick—No.

The Secretary—I think seven three-year pupils came up this year and one passed, that is my recollection.

Mr. Aylesworth—There is one thing about it, in Ottawa they pay the assistants $4 a day, and they have done that for the last two years.

The Secretary—As Secretary of the Association I hear great complaints from many people that we make the examinations too severe ; in fact, I have got the reputation of setting papers that nobody can answer.

Mr. Aylesworth—What is the object of the motion that the fees for the final examination be made $200 ?

Mr. Sewell—The object is to reduce the number of candidates.

Mr. Aylesworth—Why are you reducing the number if there are not enough ?

Mr. Sewell—There are too many.

Mr. Aylesworth—You believe so ?

Mr. Sewell—Yes. They may have a little work just now, but all that mining work in the north fluctuates ; probably in a year or so there will be very little for them to do, and they will be coming down and swamping us all over the country.

Mr. Aylesworth—That is my view of it.

Mr. Van Nostrand—I don't think, gentlemen, this last suggestion has taken quite high enough ground. Another view is that the thing you get for nothing you do not appreciate. My experience has been that the man who had to pay for what he got valued it. If a man pays for his apprenticeship, serves honestly and faithfully and learns his profession properly, he appreciates it when he gets it, and upholds the standard when he becomes a practitioner. I had the privilege of paying a bonus when I got through, I haven't quite forgotten it yet, and I don't begrudge it now. So far as I have been able to see, young men go out as transit men or levellers, or working in any particular specialty under a surveyor who is practising engineering more than surveying, they draw anywhere from $40 to $100 a month and have their articles thrown in, and they think if they can cram for the examination and get through, that that is good enough, and when they once get through they take surveying, as I say, as a side line ; and if they get an appointment in dull times as an engineer or transit man on a survey they will throw in the Ontario Land Surveyor part of it and count it for nothing, whereas the man who has paid for it wants something for it. I think we can keep up the standard of the profession better if we ask our pupils to remember they are getting something in their articles, and we should remember that we have undertaken to teach them something and to see they are ready for examination when the time comes. (Applause).

Mr. Fullerton—Mr. Chairman, I can quite appreciate Mr. van Nostrand's position. I suppose some fifteen or twenty years ago perhaps he had to put up considerable cash, and at the end of the three years he wrote on his examination, but I am sure that since that time he has been more than recouped by the number of students that have passed through his office.

What I want to find out is whether there is a shortage or an overplus of surveyors in Canada. Look at what the other provinces are doing. Take Saskatchewan and Alberta, one of them I think has an incorporated Association of Land Surveyors, and the other Province is seeking to have an Association. That looks to me as though they believed there was not an overplus of surveyors. In Manitoba they have a Corporation, I believe, and they charge $100 before they get their commission. It seems to me, in the face of all that, that perhaps our $30 is a little low I would not suggest any particular figure, but that appears to me to be a little low.

Mr. Aylesworth—If I may be permitted to speak again, the new provinces of Alberta and Saskatchewan are making very rigid rules regarding surveyors. So much so that the Dominion Land Surveyors Association has taken it up and are going to try to get some concessions from them. Amongst themselves out there they are passing very rigid rules, stating that no one may become a surveyor for either of those provinces unless he has become an actual resident of the Province for a year. It is only those who are actually on the spot at the time this legislation is passed who are allowed to get through. So far as the Province of Manitoba is concerned, a man who passes that examination (I had the privilege of looking over the papers here about two or three months ago) is, I would say, a curiosity ; and they are considered so much of a curiosity that they only allow them to get through at the rate of about one a year. So far as the Dominion Land Surveyors are concerned, I understand that the Board of Examiners are holding examinations in Halifax, Montreal, Kingston, Toronto, Winnipeg, and I suppose in other cities farther west than Edmonton, and passing young men through at the rate of ten and fifteen in each place simultaneously ; and I still think, as I said before, they are getting their titles too easy, there are too many of them being allowed to pass for the present or future requirements for a long time to come, and although it may not be in order and may not be according to the regulation I still think the principle behind the resolution is correct.

Mr. Watson—Might I ask what the resolution is ?

Mr. Sewell—The resolution is that the fees for the final examination for the Ontario Land Surveyors be raised to $200.

Mr. van Nostrand—May I be allowed to speak a second time, I had not heard the motion. I don't think it is the purpose or wish of the Association to make gain out of the candidates as they get through. If the Board of Examiners will see to it that they are the proper men and properly equipped, I think we ought to be satisfied. At the same time, members should understand that when they take an articled pupil and teach him his profession, they are giving him something he should pay for. It seems to me that candidates should pay the members who instruct them.

The President—I had to pay $400 to the party I served my time with, and I paid him in advance, too.

Mr. Smith—It seems to me it would be an improvement all around if the fee was fixed at $200, and along with that a vigorous inspector of surveys should be appointed. We all know privately that the irregularities which Mr. Kirkpatrick has just referred to are going on. They want a little more inspection than they are getting. Suppose there is anything illegal going on beside me in my practice, I don't want to inform. Nobody cares to do that. What we want is a paid inspector to see that the intentions of our Association are carried out. Boys who know nothing about the work before them are running transits and doing all sorts of things, as Mr. Kirkpatrick states, and the result is confusion. Worse than that, the result is a lowering of the status of the Ontario Land Surveyors. I think the Association is not looked up to to-day as it was ten years ago, on this account.

Mr. Niven—Mr. Chairman, I paid $200 when I was articled, and I am not sorry that I did it. I think I got a very good training. I had three years of what was pretty much practice all the time. I supported myself during the whole of that time, except when I was out on some distant work ; and I think that it is a good thing to have to pay a premium. It has not been carried out very well of late. So far as the fees for admission are concerned, it might be well to make them a little higher. Regarding the practice of surveyors in mining camps, I know a little about it. I spent some months in Gowganda last year, and I know that most of the surveyors there had in their employ parties who are not pupils, and who were not capable of running an instrument. Of course I saw many up there who were capable. But some surveyors have people in their employ who, by some means or other, learn how to set up a transit and run a line, but so far as being capable of laying out mining locations they were not fit to do it. There were some exceptions, of course, but there were quite a number there that I am convinced should not have been employed as they were.

Mr. Routly—Mr. Chairman, I am sorry I missed so much of this valuable discussion, as it is a discussion I should like very much to have heard. The question of paying articled pupils I have discussed with several members before. In fact, I have been accused of paying too much to my articled pupils. I feel like agreeing with the gentlemen who moved and seconded this motion rather than with the others who demand that a premium be paid by the articled pupil to the surveyor. It seems to me that it is very difficult to employ a man and pay him nothing, or demand a fee from him, and put him beside another man who is doing the same class of work but not articled and he is paid from $60 to $75 and $100 a month, whereas the articled pupil is paid nothing or a very small fee. I find it hard to look on a future surveyor in that way. In fact I always feel that in the future he would feel he had a slight grievance in that I had engaged him for a year or three years and had gotten a good deal of work out of him that I didn't pay for, whereas I paid another man for it who did not figure on becoming a member of the Association ; and for that reason I feel the motion to tax the candidate a good stiff fee and vote that to the uses of the Association is a move in the right direction. I believe the Association could make good use of a good deal of money got in this way. There are quite a number of things the Association could do for its members that are not being done at the present time, and probably cannot be done on account of lack of funds for the purpose, and I believe the money could be put to good use.

I am very much interested in this very thing. What Mr. Niven speaks about as to Gowganda last winter I beg to take exception to. Since I entered the practice in Ontario Land Surveyor work I have engaged at different times a number of Ontario Land Surveyors, and a number of men who were unqualified, that is, men who have not the Ontario Land Surveyor's certificate, and with all due respect to the Ontario Land Surveyors' Association, the transit men whom I have at present with me, whom I had last winter and the winter before, are better transit men than the Ontario Land Surveyors that I have had, with one or two exceptions, because there are Ontario Land Surveyors who do not know all that there is to be known about transit work. I admit I am one myself. I have one or two transit men that I wouldn't pretend to get out in the field and compete against as transit men. So far as the work of mining locations is concerned, the legal part of it, I never figure on leaving that to an assistant at all. Either myself or some Ontario Land Surveyor whom I employ looks after that part which we call personal supervision or inspection, or whatever you choose to call it. But as to the transit men and chain men I must take exception to what Mr. Niven says if he has any reference to my men. We were together last winter in Gowganda. I have not the same men I had last year. There is this about it, that there have been and are at the present time, or were very recently, men acting as Ontario Land Surveyors in the north country against whom the Ontario Land Surveyors' Association has a grievance. I believe I have a grievance, and I feel that Mr. Niven has a grievance. Last winter there was a good deal of work done in Gowganda that, as he said, should not have been done, and was not done by qualified men. There is such a thing as having assistants in the field for looking after that, and there is such a thing as not looking after that. Last winter and this winter, and ever since I went to the north country there have been men who have passed themselves off as Ontario Land Surveyors and proclaimed themselves as such, and set up in business as such, and engaged Ontario Land Surveyors to work for them, and to all intents and purposes as far as the public know they are Ontario Land Surveyors, and they are the kind of men who as a rule do very, very sloppy work. They are the kind of men I have had to conflict with and dispute with and upset in one way and another ever since I went to the new country. Sometimes there are Ontario Land Surveyors connected with them.

Mr. Aylesworth—Do they put up a notice to that effect?

Mr. Routly—No, they hardly go to that extent, although there are firms that have put themselves up and through press notices have given the public to understand they are Ontario Land Surveyors, and verbally state they are. When I speak of this to members of the Council or to some of the older members of the profession down here, they say, "Bring in your proof," and that has been a sore point with me, for I discussed it with a number of members here, and we cannot bring in the proof. If a man is competing against me in a town, and I feel he is not doing what he should do, I can't go around to do detective work and get affidavits and evidence that he is doing this, that, and the other thing and present it to the Council, because it would be ruinous to a man's standing in the community. The public would grab hold of that thing very quickly and say, He is doing it because he can't hold his own against the other man. If a man has all the practice he can attend to, he does not feel he is compelled from a financial standpoint to do that, and if he hasn't got the practice — I know for my own part if I hadn't the practice I would feel very different about getting it in that way ; I would feel the people would look at it in this way. Here is a man who can't make his living because another man is competing against him. I feel the Ontario Land Surveyors Association could devote that $200 collected from each candidate towards protecting the different members.

Mr. Smith—Along the lines of Mr. Routly's remarks, for four or five winters I was making some surveys in Somerville Township, and I ran against some work done there, and made a few enquiries. Some man living in Kinmount had been in there and had chained and compass run a lot of lines ; he was running these lines for $2 or $3 a day. I got particulars about him and I thought the matter over and intended to report it, and I just had that feeling Mr. Routly mentioned that it would look as if I was trying a little bit of rivalry. Of course we all take another view of it. That is the reason why we want an inspector. Let him work these things out. I think the Association could well afford to pay a man.

The President—I think that would be a good idea, and if a surveyor knew in his own neighborhood that there were things of that kind, he could complain to the inspector, and the inspector could find out all the particulars and prosecute according to law.

Mr. Smith—And bring the true legal aspects of the case before the Magistrate.

The President—I have known some cases in the part of the country where I live, where parties have been making surveys and charging pretty good rates for them, too. I know one now, he is an engineer under the Ditches and Watercourses Act. I have heard of him making surveys and charging for them. In cases like that the Inspector could be informed and he could get all the particulars and prosecute him, whereas the resident surveyor wouldn't care about doing it himself.

Mr. van Nostrand—I don't wish to take up the time of the meeting in discussing this thing further than is necessary, but it has struck me if we attempt to put up our fees for entrance into the profession as a body—that is, the fees payable to the Association—that we will at once have the Trades and Labor people down upon us and get ourselves into bad odor, as the Medical Council have already done. So far as the duties of the Council and Board of Examiners go towards the profession, I think they should be supported by the outside members who have these grievances to the extent of risking getting into trouble with a few of their clients and possibly reducing the number of their field parties to two-thirds of what they are now, by reporting these cases that are definite, and sending in what information there is, and taking chances on it. If they will do that the Council will take it up and see it through. The financial statement of the Secretary-Treasurer shows we are in a position to see through any ordinary lawsuit, making an example of the transgressors in this direction. I don't think it should be necessary for us to employ a man specially and pay him for the year round to look after the members of the profession or the people who without being duly authorized are competing with them.

Mr. Warren—Is it necessary to have them tried before the courts, or can they be tried before a magistrate and dealt with by a magistrate instead of coming to the court? I know there are some people up north—that is in the north part of Bruce county—that I have had pretty good evidence against, but I spoke to a lawyer about it, and he said it would be necessary to have them tried in court. I thought then it would probably be a good deal of trouble to get it done.

The President—It can be done before a magistrate if I mistake not.

Mr. Aylesworth—With all these men practising illegally it does not seem to demonstrate to me very clearly that we have not enough surveyors. It seems to me that the medical profession have detectives to go around, the name of the informer is not divulged, although the evidence might be divulged. I don't see why it should be any reflection upon a surveyor if he has direct evidence to make a complaint like that. Amongst the Doctors I don't think the name of the informant is divulged if a man is suspected of practising illegally. A doctor may send in a complaint to the Council, and the culprit is lassoed right off. I should think something like that should be put in operation here. I understood at the time of the incorporation of this Association that this was going to be one of the objects, to protect the Association from illegal practice along this line.

The President—It has been spoken of several times, but it has never got into proper shape ; that is, it has never been worked upon.

Mr. Kirkpatrick—Mr. Chairman, I think Mr. Warren is not correct as far as that is concerned. It is before a magistrate that they are brought up. But the evidence has to be perfectly clear if the Council have to take it up so that they can employ a lawyer to bring it before the magistrate, because the magistrate's sympathies in nine cases out of ten would be with the man who is summoned. It must be fairly proved ; and the Council can then take up cases in which they have been supplied with the name of the defaulter and with the definite evidence against him. But it is worse for the Association if you only go on hearsay evidence and summon a man and then you can't prove your case. The magistrate discharges him as free, and he goes then with the sympathy of the whole community that he has been a man who has been treated unfairly.

I have very great sympathy with the speakers who say it would be a good thing to employ somebody. I think it would be a very good thing, and I don't see in the world why surveyors should cheapen themselves in the way they are doing, by seeing men surveying and knowing that they are not surveyors. The information ought to be given, and then somebody could be sent up, and he could find out definite stated cases and bring those men up, with the witness to prove they made a survey and have accepted money. You can't catch a man as far as the signing of a plan is concerned, because he won't do it, but there are cases where the Association ought to stand up for themselves, where they find any man who would sign another person's work and get $5 for doing it. This is where the Association should stand shoulder to shoulder and none of the members should do that kind of thing. It has been done before in railway work ; surveyors have signed plans for engineers for right of way for $5 for 100 miles which work the engineer did, where the surveyor never went near the ground at all. I call that a lessening of respect of surveyors for themselves. I think a man who would do that has no respect for the title "O. L. S." When he is sworn in he is sworn in as a surveyor according to law, without fear, favor or affection. We have not had a case of this kind lately, but we have had them and I promptly got a letter written by the Department to the surveyor telling him I wouldn't accept the work, and he had to go over the whole work before we would accept the plans. It is now out of our hands ; it is in the hands of the Railway Commission. But when I had to examine the plans I insisted that the surveyor should make the survey himself and not merely sign them for $5. Now, the Railway Board will pass them. The next thing will be that surveyors need not sign them at all, because it is a perfect farce.

Mr. Warren—We can find plenty of cases where it has been done, but it is hard to prove they have received money for it.

Mr. Routly—Mr. Kirkpatrick has brought up something I think I can shed a little light on. You say that we should have evidence so that when we bring on a case there would not be any difficulty about convicting the man. That is the trouble. I can't get that evidence, because immediately I go after that evidence the man draws back into his shell. He won't sign an affidavit. If an inspector was sent up there I could tell him very likely where to go. I could say, You go after so and so and interview so and so. The inspector might be able to interview him in a private way without his knowing he was an official of the Association, and get him to make a statement, and then turn around and assume his authority to get him to make an affidavit. We should see the inspector was clothed with such authority that he could summon witnesses. I might suggest that you call this and that and some other witness, but I might not be sure they were just exactly the witnesses we wanted, whereas I might be quite sure the man was surveying illegally. I feel I am not appointed by the Association. To appoint an inspector to get that evidence would be the best thing, and I could help him and so could others, whereas we can't very well get the information ourselves.

Mr. Smith—Mr. Chairman, it just amounts to this, when I know there is anything like illegal practice going on, just as soon as I ask a few questions, the man that I am looking to get information from draws in, and his idea is this —You needn't say a word, this fellow is in opposition to you, and he is doing it cheaper than you are. The people want it done cheaply, they don't know whether it is right or wrong, and they will not give me that information if I choose to constitute myself a detective to ferret it out. That is the reason an inspector is wanted, in my opinion.

The President—The local surveyor can find out all those particulars without going to the man himself, and he can find out the man this person made the survey for, and he wouldn't make the survey for nothing. If the man whom the work was done for was summoned as a witness he would either have to perjure himself or tell the truth.

Mr. Smith—I could have given the information in two or three cases to the inspector, and put him in a position where he could work it up without any trouble at all, but I couldn't work it up because the people would get it into their heads I was simply trying to beat down another fellow in opposition to me, who was doing the work, as far as the public knew, as well as I could do it.

The President—If we had an inspector he would act independently whether they knew him or not. That would be the best way, no doubt.

But we have drifted from the original motion; we had better deal with that motion in some way or other, and that is in reference to the fees.

The question was called for.

Mr. Sewell—Why not refer it to the Legislative Committee to report ?

The President—Wouldn't it be better to appoint a Committee to look into the matter and find out the proper way of dealing with it ? I think that would be the better way.

Mr. Sewell—I am quite agreeable ; and then as to the inspector, that could be brought up under another heading.

Mr. Smith—Appoint another committee to enquire into that.

Mr. Watson—It is simply a question of real personal supervision as far as I can see. I think that would settle the whole business.

It was moved by Mr. Sewell, seconded by Mr. C. J. Murphy, that a Committee be appointed to report on the advisability of raising the fees for the final examination to $200 with the view of obtaining legislation to confirm it ; also on the advisability of appointing a paid inspector to secure evidence as to the irregularities.

Mr. Sewell—The other motion of course is withdrawn.

The President—That is understood.

The President then put the motion, which, on a vote having been taken, was declared carried.

The President appointed the following Committee: C. J. Murphy, H. De Q. Sewell, A. J. van Nostrand, H. T. Routly and W. S. Gibson.

REPORT OF COMMITTEE ON TOPOGRAPHICAL SURVEY.

In connection with this report, I communicated with several members of the Committee on Topographical Survey, but any communications I received in reply contained no suggestions of which I could make any use in preparing a report. I communicated with Mr. C. A. Bigger, a member of this Association, who is in charge of the Geodetic Survey of Canada, which is one of several survey branches carried on under the direction of Mr. King, Dominion Astronomer. Mr. Bigger, who was absent from home, wrote that he had prepared a report concerning his work up to the end of 1908, which he expected would be in print at an early date, and would thus be available for our information. As a resumé of the report, I may say that the Geodetic Survey of Canada was commenced in June, 1905, but was not carried on with any great vigor until 1907. Since that date a considerable staff has been engaged in the field and office, and the operations have made considerable progress. The work has been extended easterly through the Province of Quebec to a point thirty miles below the City of Quebec, and all the angles observed, while the office staff is engaged making the computations. During last September a base line 12½ kilometers (over 7¾ miles) long was measured. Its location is on the Grand Trunk Railway, at Coteau Junction.

The greater part of the older district of Ontario has been covered as far as reconnaissance and the construction of stations are concerned, but the observing of the angles was delayed by the smoke of 1908, which during that season was unusually bad. We thus see that the Dominion Government is establishing the outline work for a Topographical Survey by carrying out the primary triangulation, and thus laying down a correct basis for future work. It has generally been conceded that if this primary work were undertaken by the Dominion that the provinces themselves would take care of the secondary triangulation and the completion of the work for the purpose of compiling correct topographical maps. That this work should be carried on at as early a date as possible after the primary points are accurately fixed by the Geodetic Survey, needs no demonstration. The scaffolds constructed at the observation points of the primary triangles will after a few years become unsafe for occupation, and if they had to be constructed anew, would add considerable to the cost of completing the work. The time has come for the Provinces to make a move towards completin this great work, which has been so well begun by the Central Government, and perhaps additional time and study might be given by our students in the engineering profession to fit themselves for work of this kind. Accuracy in this class of work requires a great amount of experience. A man cannot gain the experience necessary with such practice as he gets while going through the university, nor yet on ordinary surveys in the field. He has to become an expert in the handling of instruments and the methods of eliminating errors from the results of his observations. For many years in the past, as can be seen by examining the reports of the Association of Dominion Land Surveyors, and later followed by this Association, recommendations and memorials were submitted to the Governments in power at Ottawa and in this province, setting forth the necessity of such an undertaking, until it became an old story. The old story has now become a reality, which will have to be dealt with in the near future, and it will remain for the younger members of the profession to continue the efforts until this work is carried out to a successful issue.

T. FAWCETT,
Chairman.

REPORT OF COMMITTEE ON EXPLORATION.

The Committee on Exploration have very little new matter to report upon. Those questions which are now thought of the greatest importance have been touched upon by other Committees. Still it may be interesting to note in this report that some work has been commenced which your Committees have suggested at different times, but whether these matters have received attention because of the recommendations in these reports, or were begun through a demand by the public for them, is not a question for us to decide, but some of the members of this Committee think it quite unnecessary, and ought to be discharged ; while other members feel that even if their suggestions are not acted upon, questions for discussion are brought before the Association and must have some value to the interested members.

Many members of the Association may not be aware that about a thousand miles of outlines were surveyed the past season in the Temagami and Mississaga Forest Reserves and in the Algoma and Sudbury districts, which may be very properly termed Exploratory Surveys, giving in detail much valuable information regarding the timber, soil and rock formations, as well as the amount and general direction of the flow of water.

It has been suggested that large lakes lying near the line of the Transcontinental Railway and other railway lines around which few surveys have been or are likely to be made, should be traversed and tied to a known point on these lines, so that they could be more accurately shown on the maps sent out for the information of the public.

Within the province there is a large area about which there is very little knowledge ; indeed the whole northern part 100 miles wide, extending from the Quebec boundary westerly to the district around Kenora, comprising 60,000 square miles, is a vast wilderness as far as our knowledge of its mineral, timber and water power resources are concerned. Adding to this that part of the Keewatin Territory, which His Majesty through his advisers may see fit to have annexed to Ontario, and of which practically nothing is known except that it has a coast line, it is seen that there is a vast field for exploratory work.

The surveyor is the only explorer through whom the resources of a new territory becomes known to the public. The trapper, trader, prospector and tourist are serving private interests, and very often are loath to give information which might be the means of cutting up their self-conceded territory by any influx of population through the natural channels of colonization.

It is thought advisable that the thorough exploration of the country lying between the Canadian Pacific and the Grand Trunk Pacific Railways is very necessary at present, owing to the importance of the mining camps already established in this district, and that this important matter should be brought before the Government at the earliest opportunity. The value of detail information, such as timber, rocky ridges, hills, lakes and rivers and muskegs, which can be shown on paper, is particularly useful in selecting roads to mining camps, also would save a great deal of money and time to railway and other corporations in locating their lines. Exploration surveys, if carefully made, would also assist in the protection of the best areas of timber from fire by locating them on the district maps used by fire guardians, and also give the Minister information as to the location of such timber, which owing to fire or decay should be cut.

It is also suggested when the territory included in Forest Reserves are being surveyed that such levels be taken to locate and determine upon possible reservoirs for the storage of water to equalize the flow in navigable streams, for the purposes of domestic use as well as for navigation.

It might be of interest to quote from the report made by W. Thibaudeau, C.E., for the Dominion Government regarding the water power on the Winnipeg River. He writes in 1908 : "Winnipeg River has its source in the Lake of the Woods, fifty miles east of the west boundary of Ontario. The Lake has an area of 1,200 square miles, and is controlled at Kenora by a dam 20 ft. high. The river has a drainage basin of 52,050 square miles, of which 21,650 square miles is contributed by English River. It falls 315 feet in 150 miles ; has a width of from one-third to one and a half miles, and an average depth of about 30 feet. The estimate for pulpwood on the Winnipeg and English Rivers is 5,670 square miles, or 3,628,000 acres in forest, averaging 20 cords to the acre ; this equals 72,576,000 cords of pulpwood, or a supply for 20 years of about three million tons of pulp per year, or 9,615 tons per day, and this would require 500,000 horse power to convert it into pulp.

The proportion of the different kinds of pulpwood is about as follows : 55 per cent. poplar ; balsam and tamarack 25 per cent. ; jackpine and a few white birch 20 per cent. As one goes inland, spruce, balsam and tamarack take the place of poplar. The present size of the timber is a growth of 20 years.

Niagara has a minimum horse power of 2,600,000, of which 80 per cent. is on the Canadian side; Winnipeg 43 per cent. of Niagara. Estimated horse power of Winnipeg River in Manitoba 486,800, but if the Kenora dam is controlled, the minimum horse power would be 903,300. Outside the pulp area already described, but tributary to the Winnipeg and English Rivers in Ontario, there are 12,000 to 15,000 square miles of the same kind of wood, average in size and quality, and under similar conditions.

Your Committee would urge that candidates for Ontario Land Surveyors' Examination should give evidence of their knowledge of forestry and the value of water power propositions.

All of which is respectfully submitted.

HENRY W. SELBY,
Chairman.

DISCUSSION.

Mr. Selby—I don't know whether I make myself clear on this subject. You all know there are large areas of timber that are lessened in value the longer they remain there. Every man who knows anything about a nursery at all knows that is the case, and it is only by the surveyor taking notice of and reporting this, that the Minister is able to decide what timber should be sold.

The suggestions I make in the report with reference to our students taking up certain subjects is made in order that it should be added to the curriculum. It seems to me it is an important thing for the younger men in our profession to take up these subjects. I have mentioned it accordingly in the report.

Mr. Fawcett—Whatever the reports may have been in the past, and of whatever value they may have been, I think we can congratulate Mr. Selby on this report, for it contains very much valuable information, and the points that he brings out are points which should at the present time demand the attention of the people generally.

In reference to the candidates for examination as land surveyors becoming familiar with the determination of the water powers, etc., at the last examination questions on that subject were given to the candidates, and those who had a knowledge of that subject were given marks which helped them in the total credits. Mr. Selby is certainly entitled to the thanks of this Association for the care which he has taken with this subject, and I would move that the thanks of this Association be given to Mr. Selby, and that this report be published in the minutes.

Mr. Sewell—I have very much pleasure in seconding that motion. I am sure it is a most excellent report.

The President—I think so, too ; it is a very valuable one. The motion was carried with applause.

REPORT OF COMMITTEE ON REPOSITORY AND BIOGRAPHY.

Your Committee beg to report as follows : That it has not been found possible to follow the suggestion of the last committee as to making a new catalogue of the books in the Repository but would recommend that the committee for the year do so and also that as many as convenient be placed in the vault.

At the last meeting of the Association an autobiography was read of Mr. Charles Unwin, City Surveyor of Toronto, which was most interesting and your committee would suggest that one or more of the older members of the Association be asked to contribute a similar paper at the next meeting. Respectfully submitted,

H. L. ESTEN,
Chairman.

REPORT OF COMMITTEE ON POLAR RESEARCH.

Mr. President,—The month of September, 1909, will long be remembered by explorers and geographers throughout the world. On the first day of the month the announcement was made that Dr. Frederick A. Cook, of Brooklyn, N.Y., had reached the North Pole in 1908, and that he was then on his way from Greenland to Copenhagen in the Danish vessel "Egede." To the reporters he gave a most interesting account of his two years sojourn in the Polar regions, and full details of his dash for the pole from the North Shore of Grinnel Land. He stated that he unfurled the Stars and Stripes at the North Pole on April 21st. The doctor's report was a complete surprise to the world. Although it was known that he was in the Polar regions hunting and exploring no intimation had been given that he intended to make an attempt to reach the pole. His ascent of Mount McKinley in Alaska a few years ago and many other adventures were recalled, and the majority of the reading public accepted his statements without question. The doctor was lionized at Copenhagen, bouquets, honorary degrees, receptions, etc., being showered upon him.

On September 6th, Commander Robert E. Peary, of the U. S. Navy, announced his success in reaching the North Pole by a message to Mrs. Peary, sent from "Indian Harbor," Labrador. Within a few days Peary was at Chateau Harbor where he was met by newspaper reporters from New York, Boston and other places. Dr. Cook's prior claims were denied by Peary by a message to the effect that the world had been "gold bricked."

A bitter controversy followed between the friends and admirers of the two explorers. While Cook was being lionized in Copenhagen and feted by Royalty, he also found time to deliver clever addresses and write most interesting articles for publication, for which he was handsomely paid.

Cook and Peary arrived in New York towards the end of September. The former retained his good humor, the latter his caustic reserve. Doubts had been expressed as to Cook's claims by scientific men, from the day his first report appeared, and shortly after his return to New York, certain parties in Montana, who were with Dr. Cook in Alaska, declared that he had never ascended Mount McKinley, notwithstanding his publication.

In December Cook's observations and statements were presented to the scrutiny of a Geographical Board at Copenhagen which decided that the proofs submitted were not sufficient. About this time the doctor's health failed and his whereabouts have remained undiscovered to date.

Peary's records have been accepted as correct by the National Geographical Society at Washington, but there remain a few individual skeptics.

It should be noted that Captain Robert Bartlett, of St. John's, Newfoundland, was in command of Peary's ship, "Roosevelt."

Lieutenant Ernest H. Shackleton, of the steamship "Nimrod," returned from his Antarctic expedition in March, 1909. Although not successful in reaching the South Pole, he attained Latitude 88 deg. 23 min. or only 111 miles from the Pole.

In the Antarctic the cold is more extreme than in the Arctic, and gales stronger, but the season for travelling is muc longer. Scott and Shackleton have proven that the Antarctic Continent, which, by the way, is larger than Europe, is an elevated plateau, covered with everlasting snow and ice, with mountain ranges rivalling our own Rockies. Mount Erebus, an active volcano, near the Coast, overlooked the winter headquarters of the expedition.

Shackleton will probably lecture in *Toronto or Montreal shortly. He proposes to make another attempt to reach the South Pole in 1911.

Dr. W. A. R. Mitchell, of Toronto, acted as Surgeon on the "Nimrod" in this expedition.

Mention should also be made of the failure of Wellsmen's second wind expedition from Norway.

Captain J. E. Bernier, of the Canadian Department of Marine and Fisheries, returned from his second cruise on September 23rd, 1909. He has been good enough to furnish the Committee with the following summary of his expedition :—

Ottawa, March 22, 1910.

"I left Quebec on the 28th of July, 1908, for Etah, in Smith's Sound ; from there we went into Lancaster Sound, and landed on a good many islands and took possession of all the islands from North Devon to Bank's Island. We built a depot at Erebus Bay and another at Port Leopold. We went through Barrow Strait, Melville Sound, McClure Strait, as far as thirty miles from Cape Hay. McClure Strait was clear of ice at that time, but I was not authorized to make the North West Passage. We landed a depot of provisions at Cape Providence for summer use and took possession of Bank's Land and Victoria Island.

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*Shackleton lectured in Toronto on April 27th, 1910.

"The 'Arctic' was put in winter quarters in Melville Bay, and was frozen in the first week in September, and was released from the ice the first week in the following August, we left on the 12th August, 1909.

"We did not find McClure's ship in the Bay of Mercy, but found cairns, and I have procured most of the records of the English expeditions from 1819-20 to 1853-4. We found thirteen pieces of silver and copper which were buried by Parry, Meehan, McClure, McClintock and Kellett, and we found a relic of Sir John Franklin, belonging to the "Erebus."

"This voyage was successful in many ways. The variation of the compass was ascertained to have diminished 30 deg. at Winter Harbour, where Sir Edward Parry wintered in 1819-20. The ice conditions for the last three years have made it practicable for the true North West Passage to be made at certain periods. These conditions vary in series of years.

"I am very grateful to you for your interest in me and I am glad to say that I was perfectly right in my propositions made before the Engineers' Club, and the Association of Ontario Land Surveyors, for reaching the Pole. Through Behring Strait was my Plan No. 1. With regard to my Plan No. 2 to reach the Pole on foot, that could be done also. During my lectures in Canada years ago I maintained that there were no less than 2000 fathoms of water at the Pole. I am still of the same opinion. I believe that there is yet unknown land bearing N.W. from the islands discovered by Sverdrup. It is quite evident that the islands discovered by Sverdrup were high islands and that continental shelf goes a long way in a northwest westerly direction for at least 400 or 300 miles. The ice that I saw during the winter in McClure Strait indicates that the Beaufort Sea ice cannot get out of that sea on its way around Greenland into the Atlantic and it is hampered by a chain of islands to the west of Grant Land and Ringnes Island, discovered by Sverdrup, which are still high islands. I hope this trip to put our flag on them and make the Dominion of Canada still greater. I expect to leave again about the middle of *June for the north."

In 1894 a special Committee on "Polar Research" was appointed by the Council of the Association. In the first report of this Committee it was pointed out that the largest unexplored area of the world was to be found in British

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*Captain Bernier left Quebec about July 4th for the Arctic regions

North America. Although disappointed in our hopes that a Canadian should be the first to reach the North Pole, we believe that the effort made by the Committee in directing the attention of the Dominion Government to the necessity of more fully explaining the Arctic Archipelago, were not fruitless. Year by year in our annual reports the Committee has placed on record a summary of the work accomplished in Polar Expedition, and on two occasions (1896 and 1908) they secured Commander Peary to lecture in Toronto during the annual meeting of the Association. Dr. Nansen also lectured in Toronto in November, 1897, after his notable voyage, and in 1901 our enterprising Canadian, Capt J. E. Bernier, gave a most interesting address before the Association, which did much to waken the interest of Canadians. We trust he may be spared to complete the work he has set out to accomplish.

Mention should also be made of the papers read before the Association by Mr. J. W. Tyrell, the author of "Across the Sub-Arctics in Canada," a most interesting volume.

The "Cruise of the Neptune," 1903-04, by Commander A. P. Lowe and Capt. Bernier's "Cruise of the Arctic," 1906-07 may be perused with profit by the general public, but more particularly by Surveyors.

Respectfully submitted,

WILLIS CHIPMAN,
Chairman.

REPORT OF COMMITTEE ON LAND SURVEYING.

Mr. President,—Your Committee on Land Surveying for the Association year 1909-10 beg leave to report as follows:

A very considerable addition has been made to geographical and mineralogical knowledge by the surveys of various kinds made under the Department of Lands, Forests and Mines.

In private practice the members of our profession seem to have shared in the general prosperity of the country and the Ontario Land Surveyor of even average ability and reputation who is not fully occupied is a rarity. The effect of this condition has been to elevate our status in the estimation of the public and it rests with ourselves to show by our works that this advance is only our just due.

The diminished purchasing power of the medium of exchange has made it necessary to increase the charges for surveying to meet the advance in the cost of maintaining a staff and office so that it will be some years before we can retire from practice with a competence derived from land surveying.

We may, however, congratulate ourselves upon the general uplift which our profession has to record. The examination of candidates for commissions is keeping pace with the advance being made in other avocations and the newly fledged O. L. S. can testify that the work necessary to prepare himself for successfully passing before the Board equips him for the arduous life work before him.

Appended will be found six questions submitted by members, the answers being attached.

Respectfully submitted,

A. J. VAN NOSTRAND,
Chairman.

Discussion.

Mr. van Nostrand—Mr. President, this Committee will have to ask the indulgence of yourself and the members for not having a carefully prepared report ready, but there are some matters of importance to come before the meeting, and it was thought better not to ask for a postponement. The report itself will be very short, except in so far as it includes the matters that I speak of. The Question Drawer last year was unfortunately side-tracked in the publication and was omitted. I think the idea is to have it inserted this year, together with the questions and answers, so that those who missed them last year will have them twelve months late.

We have half a dozen questions here. The first two come from a member who is in New Brunswick, and I suppose they are hardly pertinent to our methods, but we may give them.

(Reads Question No. 1, with answer.)

Mr. Kirkpatrick—I think it would be very clear if it was described as a certain lot in a certain concession, and this lot was found to be more, the work on the ground would no doubt carry. In that case he does not describe how it was patented ; he just says it was granted on an erroneous survey.

Mr. van Nostrand—It was a survey by metes and bounds.

Mr. Kirkpatrick—It is a question whether the metes and bounds would cover the land at all or not.

The President—If the survey was made under instructions from the Department it would.

Mr. van Nostrand—It was made by an authorised Surveyor.

The President—In that case I would think it was the ground that was included in the survey.

(Reads Question No. 2, with answer.)

Mr. van Nostrand—I think that is the way it is regarded here in the Department, that the squatter does not necessarily acquire any right by reason of being a squatter and having made improvements, but the Government as a matter of policy usually gives him the first claim on the land on account of the improvements.

(Reads Question No. 3, with answer).

Mr. van Nostrand—That I think we have settled on previous occasions, by direction from the Master of Titles, that we state the governing line on the plans. There is quite a long letter here from a member in Ottawa. His contention is that no plan should be registered until every lot corner has been marked on the ground. I think we have hardly time to read it unless you desire to have it. (States contents of letter.)

We considered that, and we thought that a law as stringent as what he asked for would be a hardship in certain cases. Sometimes the owners express the wish to have land sub-divided during the winter time. It is impossible to get in all the posts then, and if a survey is made sufficient for the draughting of the plans, and enough governing points established by iron posts or otherwise, it is a simple matter to stake out the lots when the frost leaves. (Reads recommendation of Committee).

The Act was changed at the last revision so that all posts planted in the original survey must be shown on the plan. I don't know whether every surveyor is familiar with that part of the Act or not, if not, and if these instructions are neglected, there is no check on the surveyor. If posts are not planted we should know it, and if they are planted we should know it. If they are planted and they are not shown on the plan, there is no one to object to the plan being filed, but the information is not in accordance with the Act.

Mr. Watson—Our Registrar insists that posts must be shown on every lot angle.

Mr. Routly—The Act reads that the position of all posts or monuments, if any, should be shown.

Mr. van Nostrand—Do we take it that the meeting is in accordance with the recommendation of the Committee, that the Legislation Committee be asked to have the Registry Act changed so that certain boundaries must be marked ?

Mr. Watson—I think that all angles should be marked on the plan at the time of registering them.

Mr. van Nostrand—The angles of all lots ?

Mr. Watson—Yes, the angles of all lots. I think the plan should be complete. The sub-division should be complete when the plan is filed.

Mr. Smith—That seems to be rather a hardship. As Mr. van Nostrand states, it might be in the winter time, and it would be a difficult and expensive thing to do, but I think the outline of the plan should be marked and posted, and the blocks. There ought to be a certain number of governing marks put in when the plan is registered and marked on the plan. Where it is sub-divided into lots I don't see any necessity for putting in posts at every corner. Posts that are planted should be marked in the plan.

(Reads Question No. 4, with answer.)

Mr. van Nostrand—This is an actual case in the Township of Wawanosh.

This question has been discussed a good deal on other occasions, and my recollection is that the latest ruling was that while blind line posts were not planted under instructions, but were planted without instructions, the fact that they have been returned in the survey and have been accepted by the Department, placed them on the same footing as if they were planted by the authority aforesaid, as the Act puts it, and therefore the original blind line post would govern.

The President—What do you say, Mr. Kirkpatrick?

Mr. Kirkpatrick—If that post was planted without instructions, but was put in the original field notes and left there, I should suppose it should be held to be an original post, but if they were instructed not to plant it and they did plant it and didn't show it in their field notes, I would say it was a post planted by them as private individuals, and I would not recognize it, but in the case Mr. van Nostrand speaks of, I think I would recognize it.

(Reads Question No. 5, with answer.)

Mr. Kirkpatrick—If that line was found to be north 14 Deg. W., and the south line was found to be south 20 Deg. east, what would you do?

Mr. van Nostrand—This particular proposition is fairly easy, because we are given the north point, which is apparently parallel to the others. We did take the exact case where the north point went rambling off, and then we said it might run due south and due east. We land up there on either side with the north point very much in that direction. You would get two lines which would never meet except by encircling the globe. The common sense method is if these lines are long enough to give a reasonable degree of accuracy, they should be produced on their own courses. We have no authority anywhere for producing, either in the Survey Act or the Mines Act, or any other act that I know of, therefore we have to take the plan and field notes.

Mr. Watson—I think the tendency now is to take the astronomical bearing rather than to produce.

Mr. Rorke—I presume the original sketch would show the lines were north and south, and east and west, and the surveyor should not be responsible for what directions his lines run.

Mr. Kirkpatrick—We had a case for examination where a similar system was followed with three or four mining locations, in which the surveyor produced it out a mile on the course ; one line produced the other out, and that is wrong. Of course a surveyor is not responsible for the posts which he finds on the ground, but when he finds that post on the ground he is not to produce it on the course of the line or on south, but he is to run one due east and the other due south until they strike. We had a case in which it was run nearly two miles away, the way the courses were, to take in a lot of water the man never intended to take in. He intended to take it north and south, and east and west, and we have decided that in the Department, and I think we have informed all the surveyors about it.

Mr. Routly—I think Mr. Kirkpatrick has mentioned a fact that should be taken into account in all these cases. Actual cases can be found on the ground in which we cannot produce them, as Mr. van Nostsand shows in that sketch, and where if they are reproduced they would not meet. Mr. Kirkpatrick mentioned another case where by producing them they met at a great distance. They are both exaggerated cases, but they are both real cases I have no doubt. Mr. Kirkpatrick mentioned there the prospector's sketch and what he intended to take in. I have always felt that should be taken account of in making any survey. There are places where I think I could find in my notes where neither of these cases would fit, where it does not do, either to produce the lines on the ground to intersection, nor to produce them astronomically to intersection, but still I think it is possible to interpret the prospector's intention and make a survey. I have one in which I have made a survey and have not produced them to intersection on the course marked out on the ground, nor astronomically, and they have been accepted by the Department. Common sense should rule. If you make a hard and fast rule that they are to be produced astronomically east and west, there will be cases where you cannot make a survey at all, where they won't meet, and other cases can be arrived at where they will meet but they will take in a very much larger area than was intended. The Mines Act does not cover the different cases, and each case must be taken separately and the prospector's sketch taken into account ; and usually when I go out I lay the matter before the Mining Recorder and then send the plans into the Department, and if they are accepted there, the responsibility is shifted off my shoulders on to the Department.

Mr. van Nostrand—There were two or three matters we were asked to take up and bring before the Association in addition to the questions. One is the certificate of personal supervision. What we recommended was that an amendment be made to the certificate to be placed on the plans so that it read: "The survey has been performed under my personal supervision, and I was in my own proper person present on the ground during the progress of the survey." That is in accordance with the Dominion Lands Regulations and it seems a reasonable one. That is a recommendation from the Committee, and if it has the support of the meeting I suppose it might have a little weight with those who control the certificate.

Mr. Rorke—Would "during the progress of the survey" mean while the surveyor was on the ground planting his posts? It wouldn't mean that he might go two or three weeks afterwards around the location. Would that be during the progress of the survey?

The President—No, not literally.

Mr. Murphy—Would the other part of it cover? Suppose he went on the ground and started his survey and perhaps before there was a post planted went away, could he then make the certificate?

Mr. van Nostrand—From the information before the Committee we came to the conclusion that while this, like the Survey Act, would not cover every case that could arise, it would do a great deal of good.

Mr. Routly—Was that not included some time ago in one of the transactions where it was laid down that the surveyor could turn over to his assistants such part of the work as he saw fit, but he held himself personally responsible and was supposed to be there to know of his own knowledge that the survey was correct? To my mind it seems to me much better that the surveyor be on the ground after the work has been finished than when it is started, or even during the progress. If you can be certain the work is properly finished, that, to my mind, is the important part of personal supervision.

Mr. van Nostrand—So far as the former proceedings are concerned my recollection is the Council was once asked to give its interpretation of "personal supervision," and I believe the wording was to the effect that the surveyor signing a certificate of that kind must have sufficient personal knowledge of the work and its detail to be able to appear in Court and give testimony concerning it, as in the case of any ordinary court cases.

Mr. Beatty—Mr. Chairman the object of bringing in that recommendation is to try to define in a more definite manner what "personal supervision" means. I don't think it was the intention of the Order-in-Council to give surveyors the privilege of employing anyone to go and make a survey and then for the surveyor to come along afterwards and stand on one corner or line of the lot and say, "I was personally present on the ground." You have got to limit the meaning of "personal supervision" in some manner. If we do not insist that the surveyor must be there and have control of the survey, why not obliterate personal supervision altogether and leave the thing wide open? If you follow the practice that has been followed in the past to its legitimate conclusion, anyone can make the survey, and the man who signs the plans can go along afterwards and stand on a spot and say, "I was on the ground, the survey is all right." It is our intention that the surveyor must be on the ground during the progress of the survey. Take a group of lots, there may be fifteen or twenty in the bunch. A man goes on the ground and inspects one claim of the bunch, and he sees that it is all right, and he then certifies they are all all right. He is not in a position to go into court and swear the survey is correct. He is not in the position to put in an affidavit if he interprets the language of the certificate correctly. He must not only go and inspect. "Inspection" does not mean "supervision." The Government sends an inspector to overlook the work that the contractors have done. After his inspection, according to the interpretation that has been put on supervision in the past, he could also say, "I personally certify to the survey," but he only inspected it.

Mr. Watson—I think the recommendation is a good one.

Mr. Kirkpatrick—There is not the slightest doubt in the minds of either the Department or this Association that "personal supervision" meant what it said, that the surveyor was to be on the ground at the time the survey was made. The supervision means that he might employ an assistant or a student to run some of the lines, and I would go so far as to say in Mr. Beatty's case, where he had twenty lots, he might have had a couple of men doing it, but he must be on the ground himself personally the whole time and inspect every line that is run, so that he can go into court and swear with a clear conscience that he made the survey. Any other explanation of "personal supervision" simply makes it a perfect farce, and, as Mr. Routly says, he might go on and stand at one corner and say he has been on the ground. We could change the wording here, "That I was myself in my own proper person on the ground the whole time during the survey." I think that would make clear what the intention of the Department is.

I can tell you, gentlemen, the Minister is going to take these things up ; he is not going to stand much longer the words "personal supervision" when he finds the surveyor was not on the ground at all. Nobody can misinterpret the wording that I speak of. I contend the man who is studying to be a surveyor ought to be allowed to do some work other than tugging a chain.

Mr. Griffin—It has been widely interpreted ; each surveyor interprets it just as he wishes. I know in some cases that the only supervision has been the supervision of the man who made the survey, and the surveyor signed the plans without ever being on the ground before or after. The only personal supervision was that he was satisfied the man he sent was able to do it, and signed the plans, and supervised in that way. I think Mr. Kirkpatrick's form covers it completely.

Mr. Beatty—The only objection that I see to the adding of the words "during the whole progress of the survey" is this, in the case of large surveys, take a surveyor who goes out for the Department and he has a summer's job. Matters are very liable to arise during that time that would necessitate his leaving the work for a short time and then he would go back. Now, he wasn't present during the whole progress, and still it is all one survey and he gives it his personal supervision. He couldn't truthfully say he was there during the whole progress of the survey. I think that is more liable to arise in the case of large contracts, but in such cases explanation could be put in to the Department that will be acceptable to the Department in case of temporary absence. A man won't do that in a small case. He could not give sufficient reason for his absence, but on a summer's work a man might have to go home for several days, and the Department could allow him to be absent for a few days on a reasonable explanation being given.

Mr. Griffin—A man is surveying a bunch of mining claims for different parties, he makes out half a dozen plans, and he has several assistants, and he is not on the ground of a particular claim, but on an adjoining claim when that one is being done. Mr. Kirkpatrick's form might be a little too rigorous in that case. He has to put a certificate on every plan separately.

Mr. Routly—I take exception to the statement of the case by Mr. Griffin here. I think that does not constitute supervision. I have, in my practice, made a point usually of inspecting the claims after the work is all finished, and, if possible, before the party leaves the ground. What I feel is most particular is to see that the survey is left on the ground perfectly finished. I make it a practice, if I can, of going around a claim beforehand, but if that is not possible, the transit men make the best they can of it, and when I go over it I very often bring them back to re-run some of the lines, if I notice some conflicting lines or something of that kind.

Putting it in the way Mr. Kirkpatrick does I think would be one of the best things for the Association. Personally, I am perfectly willing that it should be made the ruling that a surveyor should be on the ground during the whole progress of the survey. That would certainly raise the status of the profession throughout the whole country, and also raise the fees. I believe instead of getting $50 for a mining claim survey we should get $100 and then give good value for the money. If a mining claim is worth surveying at all, it is worth surveying well. I take that ground.

Mr. Niven—There is one thing certain, if you adhere to the wording of that suggestion there will be a great difference in the number of claims that will be surveyed. If every person has to go there and be on the ground during the whole of the survey of a claim, there will be a much smaller number of surveys of mining claims made than there have been.

Mr. van Nostrand—Another point : That our plan and field notes shall state the manner in which bearings shown thereon have been obtained ; if from astronomical observation, say so ; if turned off from previous surveys, say so, giving particulars sufficient to identify the data from which bearings have been obtained.

I don't know how that applies in the surveys branch, whether the surveyor is in the habit of putting in plans there and putting bearings on, which are not from observations taken by themselves and without noting the fact that they are turned off from other plans.

Mr. Kirkpatrick—I am afraid in most of the mining plans the surveyor puts on the astronomical course and does not give the observation, and in many cases he has found the course in some way, and it is tied on to another location, which the surveyor puts the astronomical observation on, and sometimes there are twenty degrees of difference between the two lines, although they are supposed to be the same bearing on the ground. Of course it gives us the trouble of sending all the plans back to both surveyors. Then it comes out they took the bearing from some other plan. One man took it from some location he had tied on to on the west, and the other man from a location on the east. I can't explain how it is, but in those cases we cannot accept the plans, and the parties are very indignant, and they want to know why they can't get their patents. There is a difference of twenty degrees in their lines, and we don't know which surveyor has made the mistake, so they have to hunt it up among themselves and find out who made the mistake. I think it would be a hard thing if every survivor had to take an observation at every mining claim, because he might be there when it was cloudy or snowing, but he should not put the astronomical course on until he has got it from some other surveyor that he can depend on.

Mr. van Nostrand—Would it be possible to have the certificate extended to include the statement that it is from astronomical observation ? If that were so the Department could send out a circular requiring surveyors to state how bearings were taken, there would then be that much additional information. As regards the bearings on the registration plans, I think if the Legislation Committee would take that up and have it inserted in the Registry Act that the governing line for bearings must be stated before the plans can be accepted by the Registry Office, it would be a good thing.

Mr. Watson—It is in the Land Titles.

Mr. van Nostrand—The Master of Titles insists upon it, but I think that is his own regulation, but the Registry Offices do not.

Mr. van Nostrand—There was one other point brought up, and that is the date to be placed on the plan. The date of the plan should be of the date of the survey to avoid the complications that arise from two adjoining surveys, one having been made after the other. We have recommended that the date that is put on any plan be the date of the completion of the survey.

Mr. Griffin—I understand in adopting that as an Association we adopt that form of certificate.

Mr. van Nostrand—The Committee recommend that, with authority to apply it.

Mr. van Nostrand moved, seconded by Mr. Niven, that the report of the Committee on Land Surveying be adopted.

The President put the motion, which, on a vote having been taken, was declared carried.

QUESTION DRAWER.

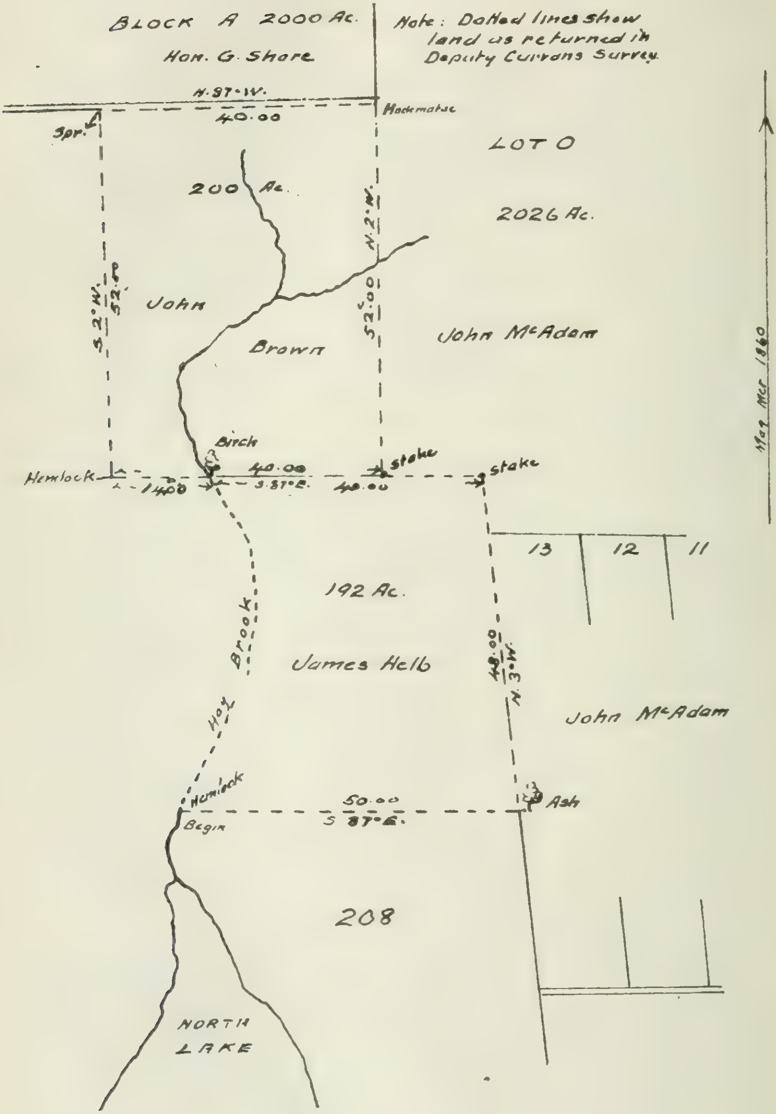
1. In 1860 Deputy Curran made a survey of two lots and returned the same as containing 200 acres and 192 acres respectively. Grant was issued on this survey and the land paid for according to acreage returned. Some years later it was found by survey that this return was grossly erroneous and that the lines as run included about twice the acreage paid for. See description contained in grant.

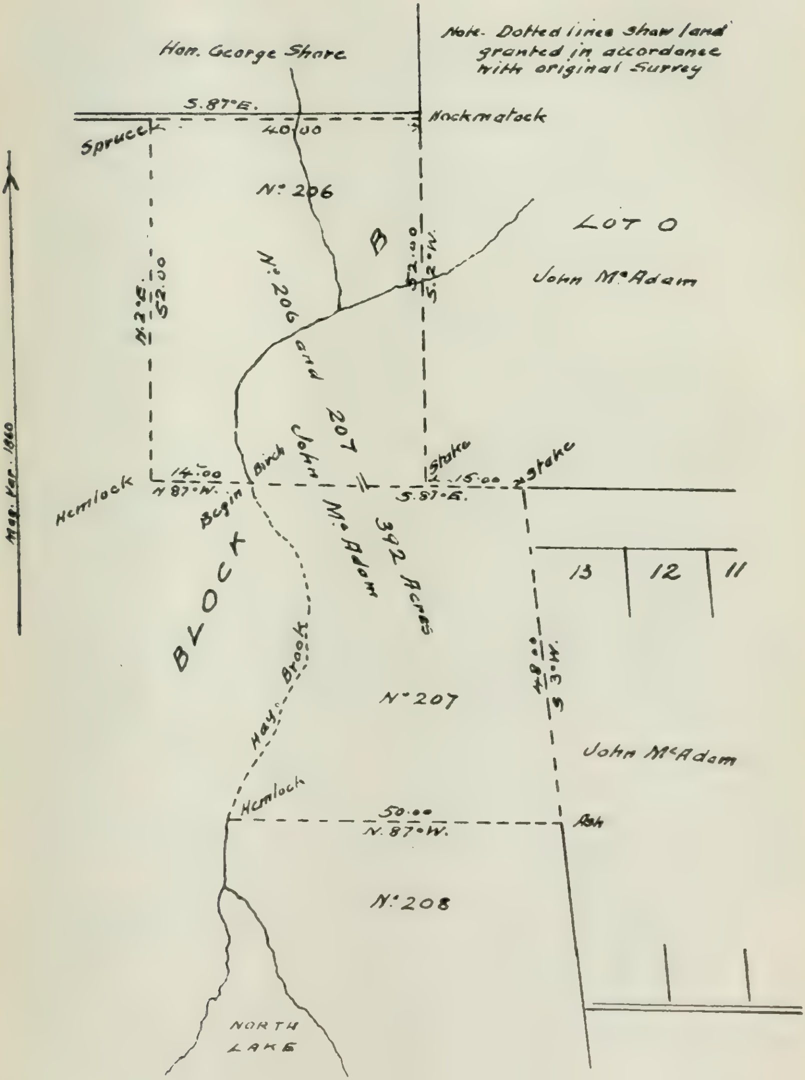
Query. — Are the grantees in this case where survey does not approximately agree with land granted entitled to all included therein ?

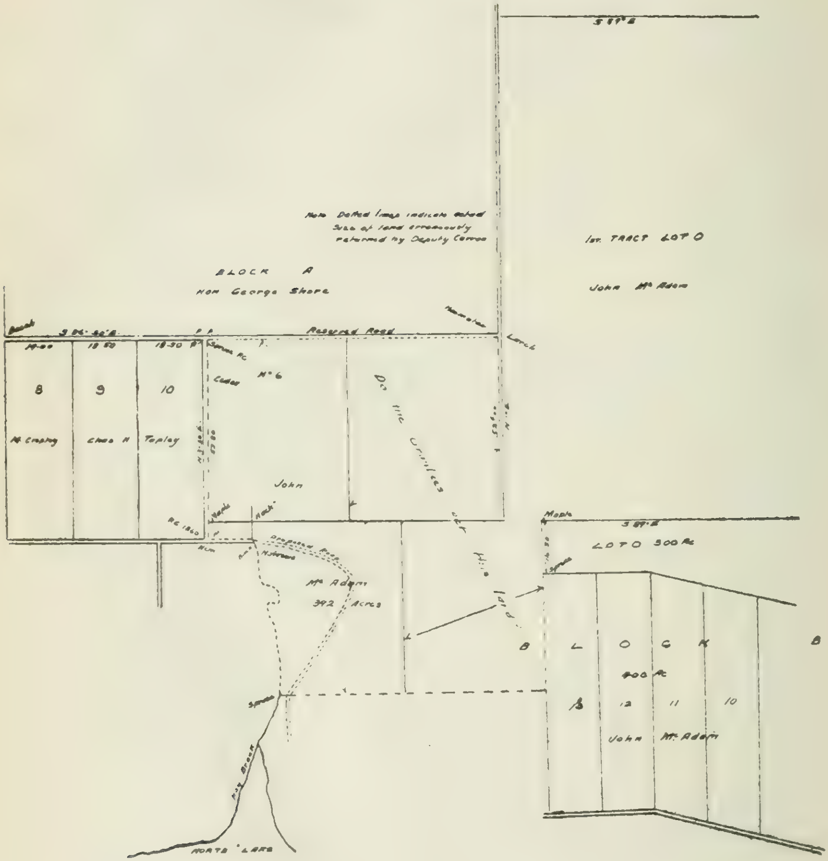
Beginning at a birch tree standing on the eastern bank or shore of Hay Brook in the western prolongation of the southern line of lot "O," granted to John McAdam, thence running by the magnet of the year 1860 N. 87 deg. W., 14 chains to a hemlock tree, thence N 2 deg. E 52 chains to a spruce tree, thence S. 87 deg. E 40 chains to a hackmatack tree, thence S. 2 deg. W 52 chains to a stake, thence South 87 deg. East 15 chains to another stake, thence S. 30 deg. E. 48 chains to an ash tree, thence N. 87 deg. W. 50 chains to a hemlock tree standing on the eastern bank or shore of Hay Brook above mentioned, and thence following the various courses thereof up stream in a northerly direction to the place of beginning.

Containing 392 acres, more or less, and distinguished as Lots Numbers 206 and 207 in Block B.

Ans. — The west boundary of the parcel granted would seem to be established by the position of Hay Brook and by the spruce tree at north west corner. The east boundary seems also to be established by the position of Block B. and by the hackmatack tree. The intention of the patent seems to have been to grant all the land between those boundaries.

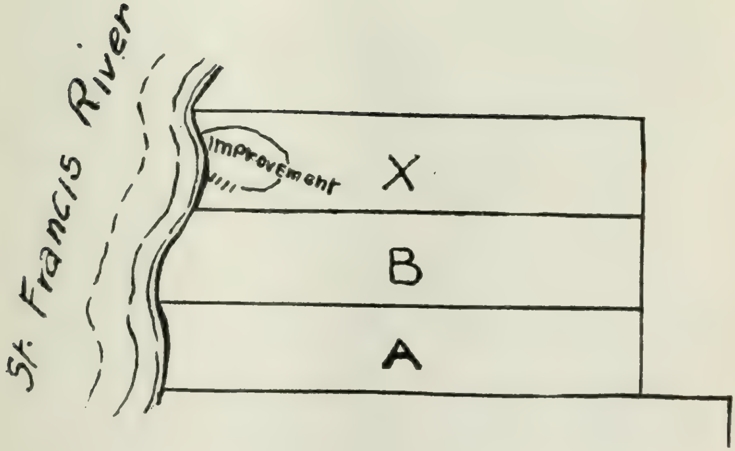

BLOCK A 2000 Ac.
Hon. G. Shore
Note: Dotted lines show land as returned in Deputy Currans Survey.
N. 87° W.
40.00
Hackmatac
Spr.
LOT O
2026 Ac.
200 Ac.
N. 2° W.
52.00
S. 2° W.
52.00
John
Brown
John McAdam
Mag Mer 1860
Birch
Hemlock
14.00
40.00
S. 87° E.
40.00
stake
stake
13
12
11
192 Ac.
Brook
James Helb
48.00
N. 3° W.
John McAdam
Hoy
Hemlock
Begin
50.00
S. 87° E.
Ash
208
NORTH
LAKE


Note- Dotted lines show land granted in accordance with original Survey
Hon. George Shore
S.87°E.
Hackmatack
Spruce
40.00
No. 206
B
LOT O
John McAdam
52.00
S.2°W.
N.2°E.
52.00
No. 206 and 207
John McAdam
392 Acres
Hemlock
14.00
N.87°W.
Birch
Begin
Stake
15.00
S.87°E.
Stake
BLOCK
13
12
11
48.00
S.3°W.
Hay Brook
No. 207
John McAdam
Hemlock
50.00
N.87°W.
Ash
No. 208
NORTH LAKE
Mag. Var. 1860


S 89° E
Note Dotted lines indicate actual
Size of land erroneously
returned by Deputy Carron
1st. TRACT LOT O
John McAdam
BLOCK A
Hon George Shore
Beech
S 86° 42' E
Reserved Road
Hemlock
Larch
14·00
18·50
18·30
8
9
10
McCrosby
Chas H
Topley
Spruce
Cedar
No 6
John
Do the Trustees of Hon. Robt
Maple
Ash
Rc 1860
Hem
Proposed Road
McAdam
392 Acres
Maple
S 89° E
LOT O 300 Ac
Spruce
BLOCK B
400 Ac
13
12
11
10
John McAdam
Spruce
Fox Brook
NORTH LAKE

2. An applicant for Crown land had made certain improvements at X and applied for a lot of 100 acres to include them. Survey was accordingly made of lot containing improvements but erroneously returned by surveyor as lot B adjoining granted lot A. Grant of lot B was issued to applicant and later on grant of lot X to another. What land does original applicant for lot X rightfully hold ?

Ans. — By title lot B. Committee does not know of any actual title accruing to squatters' improvements on Crown lands.

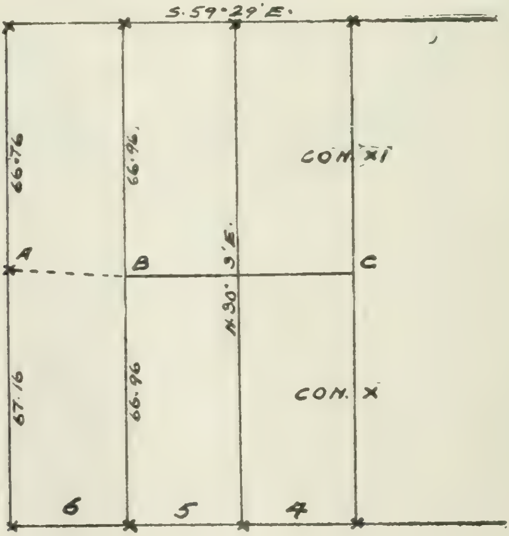


3. In preparing plans for registration should all angles of streets be marked on the ground by the surveyor before affixing his signature?

Ans.—Recommended that Registry Act be amended to require that at least the outlines of the plan and all block angles be posted before the plan can be accepted by the Registrar.

4. Lots in Township of Wananash described as Lot 4, Concession 10, 200 acres, posts planted as indicated by X. The post at A is not in the centre. The way to run the line is defined in the Act, but how are we to run the line A B, seeing that A is not in the centre.

Ans.—If post at A shown on original plan and field notes and not ordered to be eliminated we would consider it as governing. Fix point at B by proportionate division of depths and join A B.

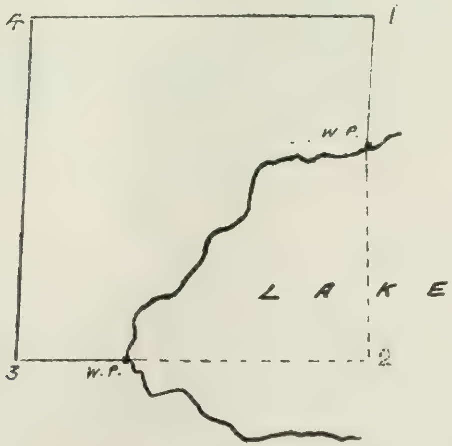


5. In making a plan of sub-division of a portion of town or city plot, should the bearing, as given by previous surveys be used and say put in quotation marks, thus, "N—45 deg. 51 min. 30 sec. E.," or should the true bearing be ascertained by the surveyor subdividing and marked N. 45 deg. 53 min. 15 sec. E., if he makes it so? And if so what effect would this have on previous descriptions?

Ans.—Astronomic courses on all lines preferred. If no observation taken, select a main line, use its previous bearing, make all other lines subservient to that, and in any case state the facts on the plan, e.g., "The North 16 deg. west of Yonge Street governs all bearings hereon."

6. What is the proper method of projecting from the prospectors' witness posts on lake shores, those portions of the limits of his claim which lie in water?

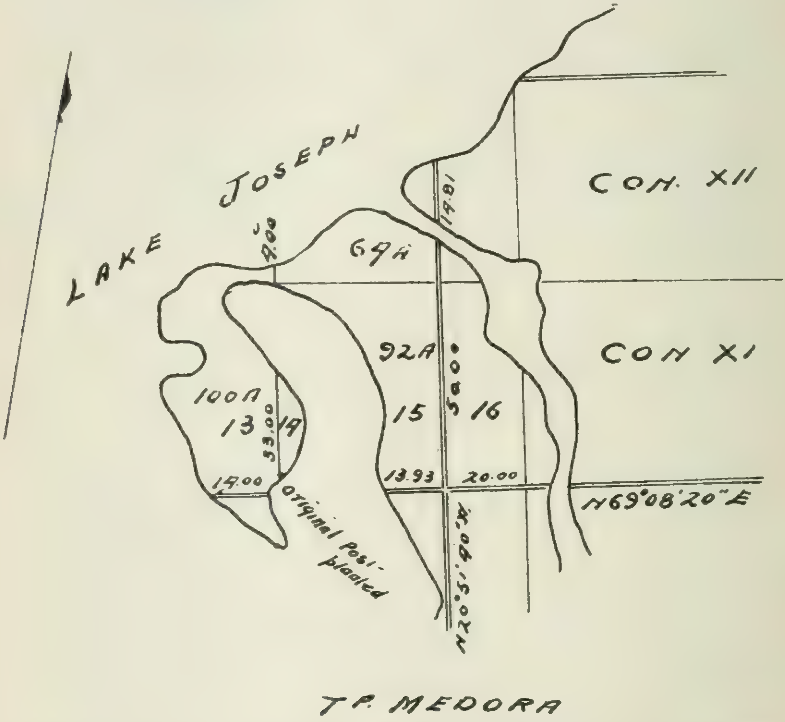
Ans.—Project on stated astronomic courses to point of intersection.



1909 QUESTION DRAWER.

Q. 1. The accompanying diagram shows part of the Township of Medora surveyed under the 1000 Ac. block system into double front alternate concessions, the instructions calling for lots 20 chains in width by 50 chains in depth.

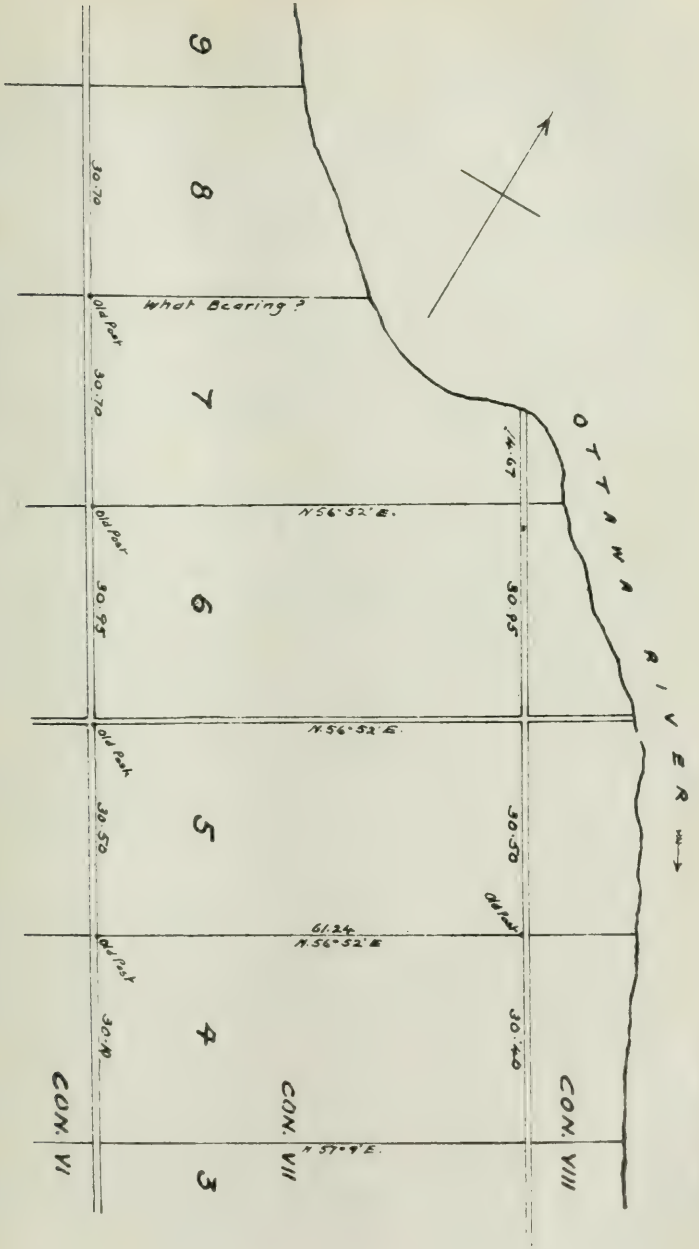
The field notes along the side line 15-16 are complete, giving the distance to the blind line between concessions XI.-XII., as 50 chains.



The notes of concession X.-XI. do not give any distance across the water from lots 13 to 15. The original hemlock tree at the shore marked for post between lots 13-14 has disappeared and no evidence as to its position can be obtained.

How should the line between lot 13, Con. XI. and lot 15, Con. XII, be run?

Ans.—Locate the blind line between Concessions XI.-XII. by proportional subdivisions on the side line 15-16 and run it parallel to the line between Concessions X.-XI. Run the


CON. VI
CON. VII
CON. VIII
OTTAWA RIVER
9
8
7
6
5
4
3
30.70
What Bearing ?
Old Post
30.70
14.67
N 56° 52' E.
Old Post
30.95
30.95
N 56° 52' E.
Old Post
30.50
30.50
Old Post
61.24
N 56° 52' E
Old Post
30.40
30.40
N 57° 9' E.

lines between lots 13-14, Con. XI., and lot 13, Con. XI, and 15, Con. XII., on the astronomic bearing given in the original plan and field notes, giving to each lot an area proportional to that stated on the original plan.

Q. 2. The Township of Torbolton is a double front township surveyed by the late Reuben Sherwood in 1822, but in 1859 (22 Vic. Chap. 83) there was a special Act passed requiring the side lines to be run from "post to post." The seventh concession beyond lot 7 is a broken front. How would the side lines in it be run ?

Ans.—It would appear that the Special Act would apply only where the concessions are full and the opposite posts could be joined by a straight line. As no posts were planted along the water in the broken front we are of opinion that lines in the broken front should be run on the course of the governing line in the same manner as if this Special Act had not been passed.

Q. 3. How would you run the line between the east and west halves of Lot number 1 in Concession III., of an ordinary six mile township ; the bearing of the east boundary of lot number 1 being shown as N. 1 Deg. 20 Min. W., and the bearing of the west limit of lot 2 being shown as north astronomic, the fronts of lots 1 and 2, Con. III. being shown as 30 chains and 80 links and forty chains respectively ; and the fronts of lots 1 and 2 in Con. IV. as 36 chains and 60 links, and 40 chains respectively ?

Ans. — Under the recommendations being made by the Legislative Committee of the Association for amendments to the Survey Act this line would be located by dividing the front of lot 1 into equal distances and running upon the astronomic bearing of the governing line.

Q. 4. Lots numbers 1 and 2, registered plan 840, front on the east side of King Street, the front measurements are 126 feet each and the rear measurements 126 feet each. The south limit of lot 1 is 110 feet and the north limit of lot 1, 120 feet, and the north limit of lot 2, 140 feet. How would you run the line between the north and south halves of lot 2 ?

Ans. — Divide the lot into equal areas by a line parallel to the line between lots 1 and 2.

Q. 6. The original plan of the Township of Bucke in the District of Nipissing shows the south boundary of lot 7 to be east astronomically and the west boundary to the north astronomically. The bearing of the lines as they exist on the ground are :—West boundary of lot 7 N. 2 Deg. 58 Min. E. Ast., and the south boundary N. 89 Deg. 55 Min. E. Ast. The line between lots 6-7 was run in the original survey and is the governing line for lots 7-8. How should a piece of land described as follows be surveyed ? Give actual bearings and length of all sides also exact area of parcel described to nearest hundredth of an acre.

All and Singular, &c.—being composed of part of the south half of lot number 7 in the first Concession of said Township more particularly described as follows : — Commencing at the south-east angle of said lot thence north astronomically along the east boundary of said lot twenty chains ; thence west astronomically twenty chains ; thence south astronomically twenty chains to the south boundary of said lot ; thence east astronomically along the said south boundary of said lot twenty chains to the place of beginning and containing by admeasurement forty acres more or less.

Ans. — The principle involved in the above question appears to be that arising from the conflict between the bearing stated in the description and the bearings of the lines referred to as found upon the ground. When a description specifies a lot line or other original boundary as a boundary of the parcel described his original lot line or boundary must be construed to be the boundary of the parcel in question whether or not the bearing given in the description coincides with the actual bearing of such original boundary. Also if the description states that any boundary of the parcel described ends at an original line as aforesaid this boundary must be construed to terminate at this original line whether or not the distance stated in the description agrees with the actual distance on the ground. The first course given in the above description would therefore be along the east boundary of the lot, and it would not be a matter of great importance whether the exact bearing of N. 2 Deg. 58 Min. E. Ast. were expressed or the direction simply given as northerly along the lot line. The second course is definite and as there is nothing to conflict with its location would remain as stated in the description : west Ast. 20 chains. With regard to the third and fourth courses there might reasonably be a difference of opinion. The general concensus of opinion when discussing the matter before the Association appeared to favor running the third course south astronomic as stated, giving the distance as 20 chains more or less to the southerly boundary ; and the fourth or last course easterly along the southerly boundary of the lot 20 chains more or less to the place of beginning.

With regard to the third and fourth courses it might reasonably be contended that a point 20 chains westerly measured along the south boundary of the lot from the south-easterly angle thereof should be construed to be the south-westerly angle of the parcel and that this latter point should be joined by a straight line with the north-westerly angle of the parcel, thus approaching more nearly to what was doubtless intended ; that is, the description of a parcel of land forming a parallelogram.

As between these two solutions there would arise the question firstly, as to whether, in general, stated bearings or stated distances should have the preference where there is conflict between the two ; an secondly, whether in regard to any course, where it be found impossible to carry out its statement with reference to both bearing and distance, it should be modified only in so far as will permit of its being carried out when considered by itself ; or whether the description should be read as a whole and the particular course modified in such a way both as to bearing and distance as will best meet the apparent requirements of the course which follows.

TORONTO CITY REGULATIONS.

Action having been taken by the Municipal Council of Toronto under authority of the Registry Act, for the purpose of regulating the sub-division of lands within the corporation, a copy of the resulting regulations is appended, and it is hoped that other municipalities will benefit by the example set.

Regulations Governing the Acceptance of Plans for Registration Purposes by the City of Toronto.

Recommended by City Engineer, City Solicitor and Assessment Commissioner.

(Adopted by Council May 13th, 1910. Board of Control Report No. 9, 1910.)

I.

1st. Before plans can be finally accepted by Council, it will be necessary that the owners shall file a draft plan in the office of the City Engineer, for the approval of the Engineer and Assessment Commissioner. Said plan shall show all proposed streets and lanes by actual survey, and in detail all obstructions on said streets or lanes, including trees, and shall also indicate streams, low lying lands or hillsides, giving the number of feet above or below level of proposed grade.

2nd. No streets accepted less that 66 feet in width.

3rd. No lanes accepted less than 12 feet in width, with turning points where necessary.

4th. No reserve strips accepted.

II.

After the draft plan has been approved and deposited with the Engineer, certified plans in triplicate shall be prepared and formally submitted to the Committee on Works, through the recommendation of the City Engineer and Assessment Commissioner, and particularly the measurements of each lot on the plans, and each lot shall be numbered, lettered or named, so that there shall not be more than one lot on the plan described by the same number, letter or word. Plans must contain the certificate of the owner and mortgagee, with affidavits of execution, and be certified by an Ontario Land Surveyor, and shall also show :

(a) The course of all boundaries or division lines and the governing line or lines to which said courses are referred shall be indicated.

(b) The position of all posts or monuments planted by the Surveyor and other objects marking the boundaries of the lots or the corners thereof.

(c) The owner shall commute all local improvement rates opposite any proposed street or lane.

(d) Where streets or lanes run to the edge of a ravine or any dangerous point the owner must agree to protect same by barricade or other means to be approved of by the City Engineer, and also enter into an agreement to be prepared by the City Solicitor indemnifying the City against any damage by reason of accident at such point. Obstructions on proposed streets, such as buildings and fences, must be removed by owner of property before City's seal is attached. If required by the City Engineer all trees are to be removed by the owner from off the centre 25 feet (in width throughout) of proposed street, and from off lanes as may be laid out on proposed plan.

(e) The City's seal shall not be attached to plan until all the above provisions have been complied with.

(f) Plans shall be on stiff pasteboard of good quality, and in case they exceed thirty inches in length, by twenty-four inches in width, shall be folded so as not to exceed that size.

(g) In special cases the Council may waive the omission or enforcement of any of the above regulations not being statutory.

REPORT OF COMMITTEE ON DRAINAGE.

Your Committee on Drainage have to report that a comparatively large amount of work was done under the Municipal Drainage and The Ditches and Watercourses Acts during the past season, and that the methods for successfully carrying out the drainage operations under these Acts are being better understood. However, there are still some points which are rather obscure and involved, and the manner in which the fees of engineers may be cut down, both under The Ditches and Watercourses Act and Municipal Drainage Act, leaves just ground for complaint.

In regard to The Ditches and Watercourses Act, objection is taken to the arbitrary manner in which County Judges often deprive engineers of their fees for work done under this Act, and some of our members have suggested that the matter of fees should be brought to the attention of the Legislature in the form of a memorial or petition to have the Act changed so that an engineer would not be liable to the loss of his fees unless there was evidence to show that he wilfully favored some party in the award.

With regard to the Municipal Drainage Act, the ground of complaint is the unfair advantage taken of the provisions of Section 5a for auditing or disallowing charges in the account of an engineer for services rendered under this Act, and several of our members have protested against the arbitrary manner in which their remuneration has been cut down under this sub-section. Your Committee is of the opinion that the Drainage Referee should conduct this audit and taxation instead of the County Judge.

One member of the Association writes that the last season was the most successful one of his professional experience, running over a quarter of a century, but he stated that the drainage laws are practically unworkable, largely owing to the manner in which the work is handled in the Municipal Councils, and the powers of the County Judges to override the opinions of the engineers.

However, on the whole, your Committee are of the opinion that the Drainage Acts are being better understood, and that drainage work is being conducted in a more successful manner than in former years, although there is still too much litigation.

A particularly valuable book of reference for drainage engineers is "The Drainage Acts," by Proctor, with notes on decided cases, published in 1908, by A. J. Poole & Co. It contains a consolidation of the various Drainage Acts, and a digest of the drainage cases decided up to the date of publication, and it has been a great boon to the members of the engineering and legal profession generally who are interested in drainage works. This work is now a hand book in Municipal Councils, and is accepted as a standard work by lawyers and judges, and very little more can be said to clear up the points treated in the volume, except to give a note of the amendments made to the Municipal Drainage Act in 1909, which are as follows :—

AMENDMENTS.

His Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows :—

1. Section 93 of The Municipal Drainage Act, as amended by Section 4 of the Act passed in the 1st year of Hi Majesty's reign, Chaptered 30, and as amended by Section 5 of the Act passed in the 3rd year of His Majesty's reign, Chaptered 22, is repealed, and the following Section substituted therefor :—

93.—(1) Subject to the provisions of Section 93a, applications to set aside, declare void or otherwise directly or indirectly to attack the validity of any petition, report of an Engineer, resolution of a Council, by-law provisionally adopted or finally passed relating to a drainage work as hereinbefore defined, as well as all proceedings to determine claims and disputes arising between municipalities or between a company and a municipality, or between individuals and a municipality, company or individual in the construction, improvement or maintenance of any drainage work under the provisions of this Act or consequent thereon, or by reason of negligence or for a mandamus or injunction shall be made to and shall be heard and tried by the Referee, who shall hear and determine the same, and give his decision and his reasons therefor.

(2) Proceedings for the determination of claims and disputes, and for the recovery of damages by reason of negligence, or by way of compensation or otherwise, or for a mandamus or an injunction under this section, shall be instituted by serving 10 days' clear notice setting forth the grounds of the claim for damages or compensation or a mandamus or an injunction, as the case may be, upon all persons concerned.

(3) A copy of the notice, with an affidavit of service thereof, shall be filed with the clerk of the County Court of the county in which the land is situate, and the notice shall be filed and served within two years from the time the cause of complaint arose.

(4) All affidavits intended to be used in support of a motion shall be filed with the Clerk of the County Court not less than 10 days before the return day of the motion.

(5) Subject to the provisions of Section 93a, no application or proceeding within the meaning of this Section shall be made or instituted otherwise than as therein provided.

(6) Where the amount awarded upon a claim for damages arising out of a drainage work does not exceed $60. the costs allowed to the plaintiff shall be on the Division Court scale so far as the same is applicable. 3 Edward, VII., Chap. 22, Sec. 5.

2. The Municipal Drainage Act is amended by adding the following as Section 93a :—

93a. (1) Where an action is brought or is pending, and the court in which the same is brought or is pending, or a Judge thereof is of opinion that the relief sought therein is properly the subject of a proceeding under this Act, or that the same may be more conveniently tried before and disposed of by the Referee, the Court or Judge may, on the application of either party at any stage of the action make an order transferring it to the Referee on such terms as may be deemed just, and the Referee shall thereafter give directions for the continuance of the action before him, which shall be as far as practicable in conformity with the provisions of this Act as to proceedings by a notice of motion, and subject to the order, all costs shall be in his discretion.

(2) This Section shall apply only where the action is brought within the period limited by this Act for taking proceedings by notice of motion.

3. Section 4 of the Act passed in the 2nd year of His Majesty's reign, Chaptered 32, is hereby repealed.

4. Sub-section 6 of Section 9 of The Municipal Drainage Act is amended by inserting after the word "and" in the 7th line the words "the Referee may hear and determine the appeal in a summary manner, either on his own view of the premises, and after hearing the parties and if he sees fit their witnesses or he may direct that."

5. The Municipal Drainage Act is amended by adding thereto the following as Section 17a :—

17a. The Council may at any time before the final passing of the by-law if it appears that there are or may be errors in the report or assessment of the engineer, or that for any other reason the report or assessment should be re-considered, refer the report back to him for reconsideration, and the engineer may thereupon re-consider his report and assessment and shall report to the Council, and the report shall have the same effect and shall be dealt with in the same manner, and the proceedings thereon shall be the same as on the original report or assessment, and it shall not be necessary that the engineer shall make any further oath or declaration.

Two decisions given by the Drainage Referee on a couple of cases are herewith appended. One of them being on the Carp River drain, a very important work undertaken in the Township of Carleton.

GEO. ROSS,
Chairman.

LYONS CREEK DRAIN.

IN THE HIGH COURT OF JUSTICE.

Between :

The Municipal Corporation of the Township of Crowland, Plaintiffs,

and

The Municipal Corporation of the Township of Humberstone, Defendants.

Before George F. Henderson, Esq., K.C., Drainage Referee.

Present : J. F. Gross, Esq., counsel for the plaintiff, and Messrs. Raymond & Spencer. counsel for the defendant.

The Referee : The Township of Crowland appeals in this matter from a report made by Mr. Geo. Ross, C.E., whi is dated the 20th day of September, 1909, at the instance of the Township of Humberstone, and which was served upon the head of the Township of Crowland on the 7th of October, 1909. The notice of appeal is confined to the grounds set out in Sub-section (b) 2, of Section 63 of the Act. There is no appeal on the ground that the scheme does not provide for a sufficient outlet. That was by reason of the fact that the assessment against Crowland is less than the one thousand dollars referred to in the earlier part of Section 63, and that the solicitor for the appellant municipality believed (and as I think properly believed) that he could not appeal on the ground of insufficiency of outlet against a report providing for a scheme assessing his township for a sum less than one thousand dollars. However, in my view of the matter, it does not become important whether or not Crowland has the right to appeal on the ground of insufficient outlet. The first ground in the notice of appeal is that Crowland objects to paying over its proportion of the cost to the treasurer of Humberstone, and the second ground is that Crowland be allowed to do the work within its own limits. These grounds of appeal have not been pressed upon the hearing, for the somewhat obvious reason that the amount of the assessment against Crowland is so small that it no doubt occurred, on further reflection, that it was not a case in which an order could properly be made. The third ground is as to the assessment between the townships. On the evidence I cannot find that the ground of appeal is sustained. The assessment against the lands in Crowland is altogether for injuring liability. No questions were put to the engineer who made the report, as to the cost of the proposed work of improvement which will go to relieving lands from liability from waters brought down from the land in Crowland by artificial means. I am inclined to think that if such questions had been put that Mr. Ross would have been able to answer them satisfactorily, because he impressed me as a man who understands his work. However, as the matter stands, there is no evidence upon which I can compare the assessments of the two townships, particularly in view of the fact that the Crowland assessment was practically altogether for injuring liability. The most serious question covered by the evidence was the question of sufficiency of outlet. Mr. Ross, who of all the engineers is in the best position to give an opinion, is of course of the opinion that his outlet is sufficient, and he gives his reasons which, no doubt, satisfied him at the time, for his opinion as to the sufficiency of the outlet. Mr. McCubbin agrees with Mr. Ross, but unfortunately his opportunity for inspection was not as good as one might have wished. He does not pretend to have made an instrumental examination, and while I do attach a great deal of weight to the mere view of an engineer of his experience, it is not as satisfactory as might have been desired. Mr. Fairchild is not in a very much better position than Mr. McCubbin. As I understand his evidence, he did not make any instrumental survey. Probably it would have been difficult for him to have done so in the season of the year during which he made his inspection. As to the engineering evidence, therefore, I am practically left with the opinion of Mr. Ross. For lay-evidence, there is the opinion of several residents of the locality, almost without exception men whose appearance would indicate them to be men of perhaps, I may say, exceptionally good judgment, and men who unquestionably have had experience (in one case, at least, very exceptional experience) and close personal experience with the working of the scheme as affecting the roads and bridges of the municipality. These gentlemen are all of the opinion that the increased water brought down will, in fact, injuriously affect the roads and bridges of the municipality. I do not for one moment doubt their absolute honesty of opinion, and if the case had come up in a somewhat different shape I might have felt myself forced to attach greater weight to their evidence than I do in fact find myself obliged to attach to it. They are not engineers. They have not made any calculation of the increased flow of water, the increased quantity of water which is going to come down, so as to be able to say to what extent (for I think there must be some extent) that increased flow will raise the level of the water in what is unquestionably a large stream. That lay-evidence is met by one portion of Mr. McCubbin's evidence, which perhaps I should have had in mind when I was referring to his evidence before, and that is the fact well known to engineers that where you have a somewhat flat grade you have to get a sufficiently high level of water in order that the force of the water itself may create a current. In other words, a certain height is a good thing, paradoxical as it may seem, a good thing for the working of the drain. Mr. McCubbin's theory, a theory commonly accepted by engineers, is that when the water gets up to a certain height a current will be created in the centre of the stream which, by its natural process, will carry along the water, and because of that theory, taking into consideration the width of the stream and other things which are naturally in the mind of an engineer of experience, he is of the opinion that there would be no serious detriment by reason of the increased flow of water which is being brought down. Mr. Ross was not examined on that particular feature of the matter, but no doubt he would have agreed with Mr. McCubbin had he been examined. Personally I am impressed with it, so much so that I am inclined to hope that the result will be that there will not be the damage to the roads and bridges which the gentlemen who gave evidence would think. If, however, there is, nothing in my finding to-day will prevent the necessary steps being taken subsequently to compel the work to be carried to a sufficient outlet, that is, an outlet at which no damage can be done. In the result, I find that the evidence is not sufficient to satisfy me that the outlet is not sufficient and therefore the appeal must fail. It seems to me that it is better for all concerned that I should leave the matter in that way, for this reason that if I were to hold to-day that the outlet is insufficient I would have to really set aside the report or amend it with the engineer's consent, and there are two difficulties in the way. In the first place I have no evidence as to where I can get (or where the scheme can get) a sufficient outlet, how far it would be necessary to go in order to get the necessary outlet ; and then the other one is that just so far as the cost of the construction of the work would be increased by carrying it to a further outlet just so far would the assessments have to be increased in the proportion that they now pay to one another, including in that assessment all the upper part of the township of Crowland. The condition here is somewhat peculiar. I feel satisfied that the people down-stream in Crowland, who are not worrying about any individual damage, but rather possible damage to their lands and roads, these people, I feel satisfied, would not want to put their neighbors in the other township to any unnecessary expense. The work, no doubt, will be constructed during the coming season and it will very quickly be seen whether the outlet is sufficient. If it is sufficient, well and good. Then Mr. Ross will be shown to have been quite justified, and he is, in fact, quite justified, in his intention in making the scheme as economical as possible. If, on the other hand, it turns out that the outlet is insufficient, I have no doubt that Mr. Ross will at once appreciate the fact that his opinion is incorrect and that the work must be carried to a sufficient outlet. If it is not so carried it may be required by a mandamus to be carried to a sufficient outlet. In the result, I am of the opinion that this appeal shall be dismissed. The question of costs is one which always requires some little thought. In case an appeal is lodged (as I am satisfied this was) in good faith, and where sometimes a certain amount of good is done rather than harm by letting a little daylight into proceedings between parties, I can readily understand (and in that respect I can emphasize the character of the lay-evidence on behalf of the appellants to-day) the class of men who gave evidence today being undoubtedly honestly and seriously alarmed lest other people should be damaged by this work, I can not find that the bringing of this appeal was unjustified. On the contrary, I think that it has probably done good, and that being the case I think that the fair order as between neighbors should be that the costs of the parties should be paid by the drainage scheme, although, with the usual provision, that costs of the respondents be between solicitor and client; those of the appellants between party and party. The costs will be taxed by the clerk of the county court here, on the scale of the High Court. The respondents will affix four dollars in stamps for one day's trial.

(Sgd.) GEO. F. HENDERSON,
Drainage Referee.

IN THE HIGH COURT OF JUSTICE.

Between :

The Municipality of the Township of Huntley, Appellant,

and

The Municipality of the Township of March, and the Municipality of the Township of Goulburn, Respondents.

And Between :

The Municipality of the Township of Goulburn, Appellant,

and

The Municipality of the Township of March, and the Municipality of the Township of Huntley, Respondents.

Present : Mr. A. H. Armstrong, for the Township of March ; Mr. L. A. Smith, for the Township of Goulburn ; Mr. W. J. Kidd, for the Township of Huntley.

Report : Trial at Ottawa on the 5th, 6th and 7th days of January, A.D., 1909.

(These three appeals heard together.)

The Carp River, which is the stream in question in this matter, has its commencement at a point in the Township of Goulburn, some little distance easterly from Stittsville Station, and in close proximity to the roadway of the Canadian Pacific Railway. From thence it follows in an approximately northerly direction through the Townships of Goulburn, March, Huntley and Fitzroy, finding an outlet in the Ottawa River. The area described in the petition, and which is sought to be effectually drained by the drainage scheme which we have under consideration, is a section of the Township of March, lying in a corner formed by a jog between the Townships of Goulburn and Huntley, and lying on either side of the Carp River, in so far as it finds its way through the Township of March. As I have stated in my report on inspection, that area is composed almost entirely of low-lying lands, which are obviously rendered nearly, if not altogether, useless, because of lack of proper drainage facilities.

The evidence is altogether uncontradicted that until about twenty years ago the Carp River was in excellent condition, and furnished such good facilities for the drainage of the area described in the present petition, that one of the lots had growing upon it in one particular year a crop of oats which took the first prize in the annual township competition, that being a township which is well known to have in it some of the best lands in the County of Carleton, which again has in it lands that are said to be second to none in the Province of Ontario. Perhaps no better certificate could be given of the value of the land, which is said to be fair average land within the drainage area, for ordinary agricultural purposes when it has proper drainage facilities, and perhaps there could be no better illustration of the advantages of proper drainage, and the folly of permitting a stream such as this to fall into such a state of disrepair as to deprive the persons owning the lands adjoining it of their proper drainage facilities.

Passing from the Township of March into and through the Township of Huntley, the Carp River is in very much the same condition as it is in March, although its banks gradually improve until a short distance below the Carp village a point is reached where waters may be discharged without doing any injury to the adjoining lands and where there is therefore a sufficient outlet with the meaning of the Statute.

On the easterly side of the Carp River throughout the territory with which we have to do, there is a high and irregular ridge or series of hills, to which I have referred in my report on inspection, and which is the watershed between the valley of the Carp and the valley of the Ottawa River, the result being that the amount of land the water from which flows into the Carp River from the easterly side is merely a long narrow strip which cannot contribute any serious quantity of water to the stream. On the other hand the land to the westerly side of the Carp River slopes back for a long distance, and there are some half dozen quite important streams serving as a natural drainage for this land, and all finding their way into the Carp River within that part of it with which we have to do, and which is to be improved by the present scheme. It is clear upon the evidence that each year large quantities of earth and silt are brought down by these streams and deposited in the Carp River. The difficulty arising in this way is probably accentuated by reason of the fact that the height of land back from the river, particularly in the Township of Huntley, is very marked, one of the streams having, as we are told, an elevation of some seventy feet above the Carp in a comparatively short distance. There are the usual number of drainage improvements in this well settled and prosperous section of the county, and in this way each year finds the demands upon the main outlet increasing. The result has been that the stream, which twenty years ago afforded ample drainage facilities for the area described in the petition, has been gradually growing worse, until for the past ten years, or perhaps fifteen in some cases, these lands have been largely, if not altogether useless for agricultural purposes. There can, therefore, be no question whatever on the evidence as to the necessity for the drainage of the area described, nor can there be any serious question but that the greater part of the non-repair of the stream is the result of its being over-burdened by the water and silt brought down from the several feeders of the Township of Huntley, as well as the Kemp Creek in the Township of Goulburn. There is of course a certain amount brought down from the eastern side in the Township of March as well as from the eastern side in the Township of Huntley, but I have already remarked that this must necessarily be inconsiderable as compared with the amounts brought down from the western side. There is also the usual amount of carelessness on the part of the property owners along the stream itself.

The land has some use as pasturage and it naturally has been used as pasturage in so far as it can be so used, and there is therefore the usual amount of damage by cattle. There is also the usual experience of permitting farm bridges to fall into disrepair, and the other minor obstructions which one finds in such a stream, but on the evidence I find that the non-repair and the present state of non-repair or disrepair of the river is mainly caused by the fact that it has been overburdened as an outlet for the several feeders which come into it from the west.

I purposely emphasize this finding because it has an important bearing to my mind upon the legal result.

I further find upon the evidence that the scheme as propounded by Mr. Moore will furnish effective drainage not only for the area in question but for the lands in Huntley along the course of the river, so far as it is intended to be improved. I also find that the result of the work will be to give to the several feeders entering that portion of the river from the west sufficient outlets, within the meaning of the Statute, where they do not have sufficient outlets within the meaning of the Statute.

Different objections, all of a somewhat minor nature, have been urged against the scheme from an engineering point of view. These I mention for the purpose only of showing that I am not overlooking them. One of them seemed at one stage to be of considerable importance. It is the fact that about a mile below the proposed outlet there is a bridge with an opening of only eighteen feet while the proposed scheme at the outlet has a width of thirty feet. I am not altogether convinced that this may not be a detriment to the scheme and that it may not be found in the course of a few years that this obstacle may have to be removed. For the present, however, I do not feel that I would be justified in finding that the engineer should have gone to the additional expense of carrying the scheme that far down stream.

I hope that the result will be as he himself says, that owing to the distance which that obstruction is below the proposed outlet, the water will take care of itself in sufficient time to prevent injury to lands. Mr. Kidd has very strongly urged upon me that I should find that a sufficient outlet can be had at a point further up the stream opposite Carp Village where Johnston's Creek enters into the Carp River. I accept Mr. Moore's evidence as to why he carries the work below Carp Village, as he does. He says it is in order to get a better grade, and his profiles show that by so doing he will get a better grade. In addition to that it appears to me that there would be, if only from sanitary reasons, a very serious objection to having the outlet of what is really an important drainage scheme immediately opposite a substantial settlement such as the village of Carp. The result is that I must approve of the scheme as an engineering proposition, and it only remain to discuss the proportion of the assessments as between the different municipalities. In doing so I naturally commence with the Township of Goulburn. As a matter of law I hold that no lands are liable to assessment for outlet liability unless the owners of those lands are actually draining their lands, and unless their water immediately or eventually finds an outlet in the proposed improvement.

I find two sections of land in the Township of Goulburn which cannot be said to contribute water to the Carp River. The first of these is the Village of Stittsville, to which reference was made and as to which the engineer has given his consent — if such consent is necessary — to its being removed from the scheme. The other is a section of the Township of Goulburn which I find to consist of lots 14 to 18, in the 11th concession, and lots 14 to 18 in the 2nd concession of Goulburn.

My checking of the report indicates that the total assessment on these lots is the sum of $47.95, and that the total assessment on the Village of Stittsville is the sum of $30.02, making a total of $77.97.

To that extent I think the amount asked to be raised by the Township of Goulburn is excessive and must be reduced, and as that amount must be provided for in some way I direct that it be added to the amount to be provided for by the initiating township, the Township of March. Otherwise, without considering in detail the different objections that have been raised to assessment of lands in the Township of Goulburn, I find that the amount charged against that Township is properly charged.

In that connection I may shortly indicate what I understand to be a proper principle of determining outlet liability as applied to the facts of the case. I quite appreciate that there must be reasonableness imported into the determination of the question of whether or not any particular lot does or does not find an outlet for its water in any particular stream. It would, no doubt, be absurd to endeavor to trace the head waters of the River Ottawa or the head waters of the Nipigon to the River St. Lawrence. But I see no reason why in this particular case I should not accept the fact, as disclosed by the evidence, that the waters from the different areas which are laid out upon the plans filed with the report in question in this matter do actually find their way in short time—in most cases a matter of hours—to the Carp River. Outlet liability is provided for, under sub-section 4 of the 3rd Section of the Act, as arising in the case of lands and roads using any drainage work as an outlet or for which when the work is constructed an improved outlet is thereby provided, either directly or through the medium of any other drainage work or of a swale, ravine, creek or watercourse. Some of the lands which are assessed in this scheme do and will use the proposed drainage work as an immediate or direct outlet. This is more particularly the case with certain of the lands with the drainage area itself and other lands bordering on the Carp River. The bulk of the lands assessed for outlet liability use the drainage work as an outlet through the medium of the several creeks or watercourses which I have described as feeders running into the Carp River from the westerly side of the stream, having their own artificial drains leading into these feeders or their tributary drains, and as a result these feeders bring down to the Carp River much more water than would naturally reach it. The proposed work will furnish these feeders with improved outlets. which are necessary for them because of the fact that no one of them at present has a sufficient outlet. Each year the water brought down by each one of these streams, with its attendant silt and other material, deposits obstructions in the bed of the Carp River, which result in damage to the lands bordering on the Carp River.

There is no sufficient outlet for these lateral feeders or for any of them. The scheme in question will give to each an improved and proper outlet and the lands using these feeders for their drainage purposes will therefore be provided with an improved outlet by reason of the construction of the proposed drainage work. It may be that this brings us very close to the line of distinction between outlet liability and injuring liability, but the practical result would be the same in either case, and no question has been raised by Counsel in that respect.

Of the many cases in which the law has been discussed I need only refer to Sutherland vs. Romney, 30 S. C. R. 495, Orford vs. Howard, 27 A. R. 223 and Elma vs. Wallace, 20 W. R. 198. The cases are well collected and discussed in Mr. Proctor's recently published work, in the notes under Section 3, subsections 3 and 4.

I must not overlook the fact that it is contended that on the evidence I should find that there is no artificial drainage on certain of the lands in the Township of Huntley, these being the Bayless property, the Argue property and the McKay property.

Mr. Bayless gave evidence as to his own property and that of his brother, as well as the property of his neighbor, Mr. Argue, who was not called. Mr. Bayless is a young man and presumably has owned the property, in so far as he has an interest in it, for a comparatively short period. His evidence, while it was no doubt honestly given, was flatly contradicted by the engineer, Mr. Moore, whose evidence in turn is corroborated by the fact that his plans, which were made immediately after a personal inspection of the property, have traced upon them actual drains which Mr. Moore says exist, but which Mr. Bayless says do not exist. If it were necessary to find as between the two, I take it to be somewhat obvious that I would have to prefer the evidence of the engineer, but I do not propose to make any deliberate finding as between the two, for the reason that after all the amount is not sufficient to disturb the proportion of assessment between the two townships, and this is a matter which can be adjusted by the Court of Revision. Mr. Argue himself is not called, and Mr. McKay qualifies his evidence by pointing out that he has some drainage through or along a road ditch between himself and his neighbor.

The evidence as to his district in Huntley, contradictory as it is, is not at all satisfactory to me, not at all like the evidence as to the district to which I have referred in the Township of Goulburn, and I cannot feel that I can safely relieve this property from assessment. I repeat that, as to all of it, the amount is not sufficient to seriously affect the assessment of the Township of Huntley as a whole, and the matter can safely be left to the Court of Revision of that township. I therefore can find no reason for interfering with the assessment in Huntley because of any evidence that has been given as to any individual lots. Mr. Kidd argues with much force that in a general way the proportion of assessment between Huntley and March is unfair because of the very evident fact that the persons whose lands border on the Carp River are going to receive an amount of benefit from this proposed drainage scheme largely in excess of the amount which they will be obliged to contribute to the cost of the scheme. The most that anyone is called upon to pay is twelve dollars an acre, while it appears that there will be a uniform actual benefit of about thirty-five dollars an acre. One can only hope and trust that this will be the actual result, and that the people in March as well as in Goulburn will be able to congratulate themselves in years to come upon the success of the scheme.

I cannot find anywhere in the evidence any evidence upon which I could be asked to disturb the engineer's proportion of assessment as between the two townships, except one piece of evidence which figures out the difference in the amounts charged per lineal foot to Huntley as compared with the amount charged per lineal foot to March for outlet liability. In view of the fact that the Act requires a great many things to be taken into consideration in estimating liability for outlet as well as any other kind of liability, I cannot find that a comparison of the mere length is of any assistance to me. Mr. Moore has obviously gone into this matter with very great thoroughness. His plans are most elaborate. When he was giving his evidence he had before him a multitude of memoranda which were stated to be original, and the more the evidence was gone into the more evident it appeared that he had exercised the greatest possible care in working out his assessments in this matter. He was under oath ; he had unusual reason for being independent in his judgment, because at the time he was making this report he was engineer for the Township of Huntley. A previous experience had taught him that a decision which would not be pleasing to the Council of Huntley meant the loss of that position and the income pertaining to it. Had he borne that in mind he would have had the ordinary human reason for carefully protecting the interests of the people of Huntley. As it is we find that he subsequently lost the position, and the only thing that one can gather from that is that Mr. Moore did not allow the duty which he assumed when he entered into this work to be interfered with in any way by the fact that he was engineer for one township or the other. I am satisfied that his work was honestly and independently done. Even if I were not thoroughly satisfied as I am with that, there is no evidence upon which I could attempt to re-adjust the assessment as between the townships. I therefore must confirm the proportion of assessment as between Huntley and March.

The result of my judgment therefore is, and I must so find and report, that both of these appeals must be dismissed, subject, however, to the variation of assessment as between Goulburn and March, to which I have referred, and if I am wrong in my actual figures these can easily be corrected.

Nothing now remains except the question of costs, always a somewhat difficult question. This is a large scheme, one which apparently has occasioned some little feeling in the community, and I do not know that any particular party can be blamed for having thought proper to have a more thorough examination of the merits of the scheme in Court. I therefore think that a fair adjustment of this matter is that each municipality should pay its own costs out of the funds to be provided by each municipality for the drainage scheme in such a way that no amount of the costs incurred in this litigation by any one of the three municipalities shall be charged against lands or roads in any other municipality. If this direction is not sufficiently clear, I will be pleased to have the parties interested speak to it later, and I will make my meaning more clear. My intention is that the lands and roads in each township shall pay the costs of that particular township of and incidental to these proceedings.

(Signed,) GEO. F. HENDERSON,

Drainage Referee.

REPORT ON INSPECTION.

Pursuant to my appointment, I inspected the proposed drainage works in this matter on the 7th day of November, A.D., 1908, accompanied by Mr. A. H. Armstrong, Solicitor for the Township of March (J. H. Moore, C.E., with him), Mr. L. A. Smith, Solicitor for the Township of Goulburn, and Mr. W. J. Kidd, Solicitor for the Township of Huntley, Mr. E. T. Wilkie, C.E., being with them. This report is made immediately after my arrival back in Ottawa on the afternoon of that day, when the whole matter is fresh in my recollection.

We met at Stittsville Station, on the Canadian Pacific Railway, and first inspected Stittsville and its immediate locality. The village is situated in what some of the parties appropriately called a "saucer," it being practically surrounded by a ridge, through which the railway cutting is the only outlet. The soil is largely sand and gravel, such as would readily absorb moisture.

Leaving Stittsville, we drove a couple of miles westerly in Goulburn. After about a mile the land became rocky; evidently of small value for agricultural purposes. The head of the Argue Award drain is about the limit of the good land.

Returning to the east of Stittsville, we proceeded to the head waters of the Carp River, where there is quite an extended swale. At the railway crossing there are three culverts, one on the north, one on the south, and one crossing under the track on the east side of the road, indicating the run of water there. There was a difference between the engineers as to the water-shed between the Carp and Jock Rivers—this difference was not very great. Obviously the whole of this territory requires drainage.

By the road from this point into March the course of the Carp would be readily followed by the eye. There are scarcely any banks, and extensive flats on either side are evidently useless because of overflowing. This condition continued along until we reached the residence of Mr. Thomas Richardson, where we stayed for the mid-day meal.

Following along through March, we walked from Mr. Richardson's along the stream to a point beyond the town line between March and Huntley. The area described in the petition is in March, the Carp River running through it. The general character is pretty much the same throughout March, a large section evidently rendered useless because of the condition of the river, which is very winding and full of weeds, silt and other obstructions, to such an extent that there cannot be said to be any continuous flow at any particular depth; at the town line the condition is especially bad.

Passing into Huntley, the banks become slightly better, and gradually improve (with variations of course) until at and below Carp village they are fairly good, though never high. There are the usual obstructions which are commonly found in streams which have not been kept in order.

All the way through March and Huntley a high ridge of the Laurentian formation runs along at a distance of approximately one-quarter of a mile from the river. This is a peculiar condition, and an important one, as this ridge forms a barrier which prevents the water from March generally reaching the Carp.

(Signed), GEO. F. HENDERSON,

Drainage Referee.

REPORT OF COMMITTEE ON ENTERTAINMENT.

Mr. President,—Your Committee on Entertainment beg leave to report as follows :

Arrangements were made to hold the annual dinner at McConkey's as usual, and the usual good service was met with.

Among the invited guests present were Mr. Aubrey White, Deputy Minister of Lands and Forests, and Dr. Kennedy, the legal adviser of that Department; Drs. Coleman, Ellis and Parks, of Toronto University; Mr. Stupart of the Meteorological Office; Mr. George Scott, Assistant City Engineer; Messrs George LeMesurier and E. D. Armour, who look after the financial assets and legal questions, respectively, for the Association ; Mr. Kelly Evans, whose services on behalf of the preservation of game are so well known ; Messrs. Barry and Wolsey, representing the Engineers' Club of Toronto; a representative of the Engineering Society of the School of Practical Science ; also Dr. Bach, Major Cowan, Messrs. J. S. Lovell, E. J. Jarvis, J. Proctor, Peter Dawson, D. G. Boyd and C. M. Canniff, all old friends of the Association and always welcome.

The members present ranged from hoary veterans to members upon whose commissions the ink was scarcely dry.

The father of the Association was in his usual festive form and did not forget to insist that the extension of the railway be duly commemorated in song.

We missed the faces of Messrs. James Dickson and P. S. Gibson and it is hoped that the next gathering will find them in their accustomed places.

That the menu was duly appreciated goes without saying and that item having been attended to, the evening was given over to toast, speech, song, story, etc. E. C. Easy told us all about "Who's Who" in so entertaining a manner that he has been prevailed upon to permit his explanations to appear in cold type, as will be seen by the appendix hereunto.

With regard to the finances of the Committee, it is requested that details be not demanded, the generous Secretary of the Association having drawn the customary pall over the balance sheet.

An adjournment for twelve calendar months was moved, seconded and declared carried, in time to enable the junior and enthusiastic members to prepare to observe Polaris off the meridian, calculate the azimuth and lay off their several astronomic courses. Respectfully submitted,

J. F. WHITSON,
Chairman.

THE TECHNICAL WHO'S WHO

By C. M. Canniff.

A canvasser has requested Mr. E. C. Easy, C.E. — that walking stress diagram of eminent engineering intellectuality —to join the new social club for technically trained men in Toronto, and desired to know whether the notable expert wished to be fyled away as an engineer, or a surveyor, or an architect ; and if the first, what kind of one. There was the rub. Mr. Easy could not make the grade.

The great man was undeniably cross. He unloaded himself on poor defenceless me. He does not usually employ strong language but he flung everything to the winds on this occasion. He smote his thigh.

"Crumbs !" said he, "Bread crumbs !" With that he blushed.

"Whither are we drifting ?" querulously he demanded, his thought-corrugated visage astare at the ribs in the arched ceiling. "Where is our ancient and honorable profession off-getting-on-at ? What would Stevenson have thought, what Smeaton said, not to mention James Watt and other foot-rule gentry — the old masters of rare technique who inveigled their pictures into history, as authorized for use in the public schools in Ontario." Mr. Easy shifted his chair and contrived a bow-knot out of his long legs. He was getting wound up.

"I would just like to have glimpsed the dago face of him had Nonius Datus, Esq., C.E. (A.D. 152),* the underpaid hydraulic engineer of the Third Legion, been buttonholed, as to his toga virilis, by my friend the canvasser.

"He said he was a young engineer. He had a viz that looked as if a lot of field rivets had been skipped. But he was oily — slicker than the hair on a Petrolia frog. He was so smooth he wouldn't retain at 50 to 1, and that's agoing

* Dean Galbraith's Valedictory as President of the Canadian Society of Civil Engineers (1909) was evidently surging through a certain brain which we will designate as "X".

sum, as they say in the Arithmetic. However, he didn't get mine in his bunch of classy tracing-cloth signatures. This new club is to consist of engineers, architects and surveyors. Do you take me ? A dinky triangle of money-needing forces. Now, as proved by laboratory tests, I'd crave to enquire, where's the dividing line, the party wall. When they say engineer, do they mean engineer, or (perhaps it is shown plainer on a section), when is a hen ?

I kept still, perfectly quiet. Mr. Easy — that past master of scientific profundity — was not one to be argued with. Perfect, beatific stillness. The sound like a giraffe gargling was only a water pipe outside.

Mr. Easy resumed. "I s'pose that fat-head canvasser tried to see would I get rattled ; must think I'm chief engineer at a mechanical toy factory — baby rattles a specialty. He is apt to be in the Burke's Peerage of Smart Alecks who would belay you to a street corner and cause you to miss a transfer while he contributed to your already overflowing think-reservoir the balmy, uplifting hypothesis that hydraulic engineers trek in two brigades — those who work at it and those who drink it. The muzzle legislation should include the likes of him. Wouldn't his pronouncements add to the gayety of nations and merit a floral tribute of price ; wouldn't the mover stand a good chance for the chairmanship — he'd be carried out unanimously. Never mind, don't worry, the golden orb will yet rise on a working day of 24 hours when he'll find his own level — also transit. Civil engineers and impolite surveyors alike are often fain to. And often borrow them — also other articles of a field-work toilet."

"Bug-house ! I should so conjecture. Right up to the nth ! He'll never turn out any John G. Pocketfiller, or J. Bluepoint Sturgeon, or Lord Skincoona. That's my one best comment. I fully expected him to volunteer that a sanitary engineer is one who may be crazy, but lacks the funds to board at a decent, comfortable Insane Asylum. Oh, Crumbs ! Also that a Railway Engineer, if you get on to his curves, is different to all others, because he travels in a special train of thought. How would that hit the genial, sage and strictly moral architect of a jerk-water stump-dodger ? Without the aid of a lens one could discern the palpitating bulges made by pathetic, lost-chord, looney ideas of that character taking exercise in his forehead's back-yard."

"I expected him to tell me that mining engineers are noted for doing a lot of low-down work, and being experts on the seamy side of life. What? No, that canvasser's got no surcharge of technical fill behind his back. He an engineer! Crumbs! Crumbs! If he were my assistant for about a minute I'd kink his tape, I'd glue up his slide-rule."

"He'd not be suggesting any more that roadway engineers should mend their ways; or that a surveyor's best plan is to make both ends meet when he starts in to callous his elbows over the drawing board; how would they, for instance, like to be told that surveyors don't work at all — simply are low comedians, playing problem plays at measure for measurable wages? Like as not one of his simpering inanities would be that all engineers, save the stationary fellows, are generally working themselves out of a job. I believe really that that chap could encase a square meal and dreamlessly go to "bye-bye" after defining a civil engineer as one who made mountains out of molehills, and vice-versa each to each; likewise explaining how they were called civil, enjoying as they did a bowing acquaintance with other clans of engineering talent."

"Answer me. Why can a punk applied mechanic like that buy India ink at the same price I pay? Consider not a kid-gloved vernier twister at all — for even a common draughtsman who draws the line at $40 per — making black scratches on white paper — could tear off reams of lunatic specifications like that. Possibly have the decency to accord his face a flat-wash of carmine too. A licensed set square chauffeur doesn't amble forth in the stilly night and imagine himself formed into a scientific brain merger every time he feels chesty enough to buy celery and Roquefort after an evening's close figuring at the Star Theatre or the Gayety. He resembles our University—he's got some reasoning faculties."

"How would a surveyor like to be called a 'Poduk-asin Ashish-kie-ikank' just because it's Ojibway for 'stick-in-the-mud.' That's the brand of insipid sop his crater would be liable to erupt. He'd be spending that grade of small change like a soused inmate of one of our saucy Canadian Dreadnoughts. It's enough to make a really truly and sincerely engineer hire an aerotaxi and drome away and dee."

There are engineers by profession and those who profess to be engineers. Both amateurs and professionals enter the engineering Marathon. As Peary remarked with that 'welcome-to-our-Polar-city-smile' of his: 'Many are Cooked but a few are frozen.' More probably Peary was considering a human being than cold storage meat. What yer know 'bout dat'?

Now, it is an interesting— to most a likeable—attribute of Mr. Easy, this eminent authority with a strangle-holt on technical wisdom -- that one can rarely fathom whither his next thought is trending. In his public or private life one can say, like the girl with steel corsets who learned to run a compass — that he has a certain inherent attraction in his surroundings.

"I'll bet a silver-plated protractor as big as a cart wheel," asserted he, "against a rusty pair of spavined dividers that that pin-head canvasser will suggest to the chemical engineers a letter-heading along the line of the attached sublime sentiment:

'Little Johnnie's dead and gone,
'We'll never see him more;
'For what he took for H_2O
'Was H_2SO_4.'

Dot is sense, vot it is, is it? Ach?

"How would an individual who ponders week in, week out, in terms of galls. per sec., or lbs. per sq. in., care to be told that a mechanical engineer can be identified by the oil he puts in his salad dressing? Would getting caught in a belt like that be a relish? Oh, you kiddo! Would you subscribe to a structural engineers' being one who approves a rotary mixer rather than every-day Radnor, or an occasional observation of Apollinaris with its accustomed satellite. Details of the personal character of electrical engineers, with him, would pass current for juicy. Isn't that joke ripe for its old age pension? Do elevator engineers make a social pastime—a pay-as-you-enter relaxation — out of the gold cure? Woe's me! I imagine he considers the Architect's function is to take an engineer's plan and dot the i's and cross the t's, and put some curlimagigs on the capitals."

It was at the Engineers' Club that Mr. Easy had unbosomed himself to me as above. Two or three members had joined us in the interval. Then the power went off, the lights went out, and everybody made for the street. As I felt my way down stairs I could catch some drift of a hit-the-bull's-eye definition of an engineer: "a man," (as near as I could gather) "with a quality of brain to figure out beforehand that it's not necessary to turn a horse up-side down to get on its collar."

Here a slip on a step, and a quick-fuse, muttered invocation to — sounded like "Happy Hooligan" or "Holy Hexigons." Then a match scratching . . . a little later, "but that canvasser . . . light another match, light two, light a box . . . his advertisement would read . . .

" 'Bridges Designed Free.
If not Built
No Harm Done.' "

And next . . . "Sure! He was maison du scratch . . . them's Penetang French for 'bug-house.' " . . . Another slip on the stair . . . a determined, seismographic, a most tasty one, likewise a flash down below like Halley's comet, then a convulsive "Thank God! Cheer up, here's the door. O, Crumbs! . . . " When I reached the street Mr. Easy and companions had faded and gone. All was quiet. I found my way and wended it. The new club is determined upon getting the most eminent engineering prodigy of our land and age to join, but it is still on the waiting list.

PAPERS.

[*This Association is not responsible, as a body, for the opinions expressed in its Papers by Authors.*]

THE MOUTHS OF THE PIC RIVER.

BY H. DeQ. SEWELL, D.L.S., TORONTO.

In passing over the country between Heron Bay and Peninsula Harbor, on the Canadian Pacific Railway, on the north shore of Lake Superior, the first thing that strikes one is the unusual amount of disturbance in the Pleistocene gravels and sands, which meets the eye at almost every step. We find numerous "giant cauldrons" or "potash kettles," together with long whaleback ridges of sand and gravel and boulders within a distance of twelve or fourteen miles along the lake shore. What has caused these phenomena, whether water or glacial action? is the purport of this paper. If water, it must have resulted from a series of floods or debacles, carrying everything before them, with great force and velocity ; if on the contrary it has been formed by glacial action, we would naturally expect to find traces at least of similar glacial action along the most of the country facing the north shore of Lake Superior, and certainly we would not expect to find Pleistocene gravels and sands, confined almost entirely to the vicinity of the rivers and streams, emptying into Lake Superior, and we also would naturally expect to find these gravels and sands freely distributed over the entire area, in the valleys and hill-tops, of places where they could not possibly have been carried by water, that is, if it were physically possible for a column of ice covering the entire country to transmit a slow pressure greater than an equivalent to 370 feet, at which depth Mr. Oldham found ice would yield, while under a pressure of 960 feet of its own substance it would be crushed, or in other words a column of ice in prehistoric times, must have had a greater power of cohesion than it now does, and certainly more than neve, or ice formed from snow, which is structurally weaker. This is a question which has never to my knowledge been answered by any adherent of the glacial theory. But I do say that if any glacial action ever existed, as has been claimed to have existed, on any part of the earth's surface, it certainly could never have existed within the area of the present watershed of the North Shore of Lake Superior, for the simple reason that if it had so existed, it would have left these Pleistocene gravels and sands in the valleys and on the hilltops of some places, where they could not have been carried by water distributed through ancient water courses, not necessarily in every case, but certainly in some. And because this does not so occur, we can fairly claim that glacial action could not possibly have existed within that area. In other areas such as the vicinity of Toronto, we find the delicate shells of the uno and other fossil remains that would have been crushed by the so-called glacial action. But here we are dealing with a far more ancient era, possibly 200,000 years earlier than the Pleistocene as found on the shores of Lake Ontario. This conclusion appears to me to be inevitable, as in the Pleistocene formations as found on the North Shore of Lake Superior, there is an entire absence of fossil remains of any sort, so far discovered, that I have ever heard of. Some fossil remains have, however, been found in the limestone formation north of the height of land (probably Devonian), but even if these limestones have contributed to the Pleistocene, as found in the valley of the Pic River (as they probably did), their fossils were far too ancient and too fragile to avoid being ground down, when being incorporated with Pleistocene gravels and sands. Thus the question resolves itself — Were these phenomena caused by the agency of water ? If so, where did it come from ? Evidently by water, and by water alone, and it has been flowing from north to south through the Pic River Valley to the waters of Lake Superior. The Pic River takes its present rise from McKay's Lake, near the present height of land about 80 miles due north from Lake Superior. From there it runs south to its present outlet into Lake Superior (about 3½ miles south of Heron Bay Station.) Roughly speaking, the first half of this distance from McKay's Lake is through Laurentian Rocks, and the latter half is in the Huronian, although there are probably bands of Huronian and Laurentian interspersed. There are, however, no other formations within this area prior to the Pleistocene gravels and sands, together with their variations in the form of till and loss. The bed of the river is now deeply sunk into these gravels and sands. Mr. Hugh Wilson, who surveyed the Township of Pic in 1873, describes the banks of the Pic as being constantly undermined and falling into the river. He also remarks that there is a considerable bar or delta at the mouth of the river where it meets the waters of Lake Superior, which conditions still continue. The bed of this river is very sinuous, chiefly caused by barriers of the primary rocks (Laurentian and Huronian), which in its endeavors to reach Lake Superior, it has been forced to overcome, and as each obstacle was surmounted, either by going round or breaking through, the pent up waters would necessarily rush forward, tearing away every obstacle that obstructed its course, until it had either spent its force or was stopped by some other obstacle sufficiently strong to check its rapid course. This would then be repeated and repeated again and again, being a series of numerous debacles which have changed its bed from time to time, each change tending more or less to straighten its course. Primarily the river necessarily passed over nothing but Huronian and Laurentian rocks, as no sands or gravels could possibly exist until produced by denudation of previously existing rocks and possibly from similar denudation of the limestone and other rocks lying north of the height of land as it at present exists. As these rocks become water worn, the resultant boulders, gravels and sands would be washed down and deposited wherever an obstruction occurred, the larger stopping first, and as the stream became more sluggish their size would decrease until at last nothing would remain to be deposited except clay, loss and sand. As, however, these gravels and sands extend for considerable distances on either side of the present stream, it follows that in the Pleistocene epoch, when these gravels and sands were first deposited the water flowing through the river was considerably greater than it now is (probably the height of land was further north and the annual waterfall may have been greater). Anyhow it was sufficient to flood and cover the entire valley of the Pic and later on fill it up with gravels and sands. The subsequent wearing away and denudation of the gravels and sands forming the present bed of the river being a much more recent operation, produced by the reduction of the waterfall and watershed. We find the same results occurring on the Nipigon, the Kaministiqua and other rivers emptying into Lake Superior on the North Shore, although the disturbance is considerably less than at the Pic.

About ten miles north of the present outlet of the Pic River into Lake Superior, we find evidences that in prehistoric times there was a barrier of considerable size. Part of this ancient barrier still exists, as rapids over the Huronian rocks. Westward and about parallel with the north boundary of the Township of Pic is a deep ravine with Huronian formation exposed on the north and south sides. The north side is partly covered with sand and gravel and the south side less so, thus clearly showing that the current was chiefly exerted on the south side. We find numerous perched blocks and some large "potash kettles," the former largely on the sides of this ravine and the latter in sand and gravel in the bottom of the ravine. Some are very large, varying to 100 feet in depth by 200 feet to 300 feet across. This extends for about 2½ miles westward from the river, when this ravine is suddenly terminated by a rise of about 200 feet over a waterworn bank of gravel and sand. Judging from the surrounding rocks I assume that this bank is covering an obstruction in the form of Huronian rock, as these rocks flank on either side. This plateau extends about another mile to another Huronian hill top about 300 feet above the level of Lake Superior. In this mile there are three large "potash kettles" about 200 feet to 300 feet across by about 100 feet in depth. From this the ancient Pic River followed a ravine, dipping suddenly about 100 to 150 feet, with Huronian rocks on either side to Port Munro about 5 miles. About one mile from the entrance to this ravine I found a "potash kettle" about 6 feet in diameter cut out of the solid rock. It was almost a perfect cirque by about 10 feet or 12 feet deep, possibly deeper, as there was snow on the ground when I saw it. To have reached that depth in solid Huronian rock it must have been submerged for at least 300 or 400 years, and as this was on the hillside the depth of water during that period must have been considerable. Port Munro probably was at one time an outlet of the Pic River, possibly for a comparatively short period (geologically speaking). Then the river evidently broke out another outlet around the west side of the range of hills described as the south side of the first ravine west of the present bed of the Pic River. This is still occupied by a creek, which empties into Lake Superior. After getting around these hills the ancient river apparently did not follow the course of the present creek, probably owing to some obstruction. But it turned eastward, following the southerly foot of the before mentioned range of Huronian hills. Here we find numerous ridges of Asar or Whaleback, lying in tiers one above the other, the boulders and gravel being packed together with perfect regularity (with the larger stones on top and the smaller ones below) as if done by hand, thus presenting the appearance of terraces, over which the water must have flowed, as the stones have evidently been well rounded and water worn. Below this there are two small lakes connected with each other but with no surface outlet to the lower or larger lake ; but as there are several springs on the hill side south of the Canadian Pacific Railway which empty through gorges into Lake Superior, the outlet from these lakes is undoubtedly subterranean. About 3½ miles eastward from the last mentioned creek, along the Canadian Pacific Railway, we come to Craig's gravel pit, where it is undoubtedly stratified, thus proving the agency of water. Prof. Colman, who is a strong supporter of the glacial theory, whilst admitting the stratification of sand and gravel, claims that these beds "were probably at the mouth of a river in a glacial lake," describes the terraces here as respectively 409 feet at the highest point above the lake, the highest terrace being 378 feet and the other terraces 357 feet, 130 feet, 85 feet, 67 feet and 45 feet respectively above the lake. He claims that the lower terraces are well formed storm beaches, but that "the two higher ones do not show wave action." He also says : "A very interesting point was the discovery of two immense kettle holes on the edges of which the gravel pit was beginning to encroach, one of the kettles had been somewhat breached by the lake before the railroad was built. The first kettle visited we estimated to be 150 yards long by 75 yards wide, the longest diameter lying east and west. Its walls have a uniform slope, the bottom being 225 feet above the lake, so that from the highest part of the rim the kettle has a depth of 180 feet. The bottom is dry, no doubt because of the good drainage afforded by its walls of sand and gravel. Another kettle a short distance to the west is about one-third of a mile in longest diameter, but less regularly shaped and shallower, its bottom being 260 feet above the lake." He seems to be at a loss to account for these kettles, but assumes that they may have been caused by grounded icebergs remaining unmelted sufficiently long "while 180 feet of sand and gravel were being laid down." The conclusions to be drawn from these phenomena appears to be, 1st, that the Pleistocene gravels and sands on the north shore of Lake Superior are far older than those found on Lake Ontario, owing to the entire absence of fossil remains ; and 2nd, that their origin is undoubtedly due to the action of water alone, as otherwise there would have been no stratification, of which there is ample evidence.

Discussion.

The President—Gentlemen, are there any questions you wish to ask Mr. Sewell in reference to this paper ?

Mr. Niven—Mr. Chairman, I came down that river about a year and a half ago. It was quite an interesting trip. I did not have time to stop long and look at anything in particular, I was in too great a hurry to get out ; I hadn't very much to eat ; but it was quite interesting in many places, particularly down towards the lake where the banks are very high, and there are some high falls and rapids there. Mr. Sewell has taken quite a lot of trouble to give us the account that he has, and when it is published in our proceedings it will be quite an interesting paper to read. I move that a vote of thanks be given to Mr. Sewell, and that his paper be printed in the report.

Mr. Selby—I will second that, Mr. Chairman. Carried.

Mr. Sewell—I thank you, gentlemen. It has always been rather a hobby of mine the exploiting of the so-called glacial theory, and I think this is a very strong illustration, for the simple reason that there are no fossils there, and there must have been at least 200,000 years between what we find down here and what we find there.

Mr. Fawcett—Do I understand that those kettles are large scoops in the rock ?

Mr. Sewell—Just scoops in the rock.

Mr. Fawcett—And yet they are dry ?

Mr. Sewell—In some cases. There are two that are not ; they are full of water.

Mr. Fawcett—You spoke of some perfectly dry on account of the drainage.

Mr. Sewell—Yes, they were all dry except two : those two are lakes. The westernmost one supplies the water tank at Peninsula Harbor, and the water empties down on the shore.

Mr. Fawcett—Your theory is that those kettles were formed after getting a start by the water whirling stones around in them ?

Mr. Sewell—Yes.

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THE INTEREST OF ONTARIO IN THE WEST.

BY H. W. SELBY, D.L.S., TORONTO.

Not being directly identified with the active work of Ontario Land Surveyors I did not feel that I could do justice to a paper especially devoted to the profession, (but our genial secretary, anxious, as usual, to have a full programme, invited me to read a paper which he was kind enough to say would be acceptable, although not directly relating to the work of Ontario Land Surveyors), but you are all aware that I have been engaged for the past seven years on Dominion Lands Surveys, and in the exercise of the right, which every traveller has, to take notice of what is going on, and pass it on for the benefit of those who may not have the chance to see for themselves, I offer a few thoughts as to "The Interests of Ontario in the West," which I do not suppose for a moment are new to most of you, but may be the better for being repeated.

In the first place, Ontario, being the premier Province of this great confederation, must appreciate the fact, and to a certain extent be proud of it, that the leading men of the West are Ontario men, and although from the mixed character of the population, good men of other nationalities are aiding in the upbuilding of the new provinces, still the lines of government, and the conduct of business generally, are modelled more upon those of Ontario than any other Province.

One important exception might be mentioned in passing, that is, in regard to the transfer of land titles. All patented property is registered under the Land Titles Act, and a certificate of title is less troublesome and more satisfactory than a casually drawn deed which no matter how carelessly drawn may be registered, and the owner sleep peacefully for years under the impression that it is correct, when he may be suddenly awakened to the fact that he has a deed of another man's land. A modification of the Henry George theory regarding the taxation of land values has been adopted in many of the districts and cities of the West.

The feature that interests Ontario more than any other is the competition for the vastly increasing trade with the West in manufactured goods and machinery. The position of the populated part of the West, in being adjacent to a large part of the United States and easily accessible to its manufacturing centres, while it is separated from the manufacturing centres of Ontario by thousands of miles of country in which there are few people, together with the fact that thousands of American citizens are making their homes in the West, all knowing what money can buy in the States, makes it a serious question to Ontario as to the best way to hold a fair proportion of that trade. Manufacturers and wholesale merchants are cognizant of the immense value of these markets, and are quite alive to the necessity for activity in securing their share in the development of the West, but in spite of the high tariff, much of this will be lost unless Ontario can produce cheaper and better articles for their consumption. This involves two important questions. First, cheaper production; secondly, the keeping up-to-date in the quality. No people in the world demand the best more consistently than the wheat growers of the West. They forego many of the pleasures which are enjoyed in the East by the majority of the people. To make up for these they buy good food, dress well and furnish their homes in a way which would be considered luxurious to many here.

Loyalty to the British Empire is very noticeable, but it does not interfere with what money can buy elsewhere. One will see the catalogues of the big department stores of Chicago alongside those of Toronto and Winnipeg in many homes. The same may be said of buying machinery of all kinds. The fact of an article being labelled "Made in Canada" does not appeal to the western man unless it is equally good or a little better than if made elsewhere, therefore it is up to our manufacturers, dairymen and fruit-growers to be honest and turn out the most satisfactory product to hold the vast trade which will grow up in the West. The fact that the raw material for almost every kind of manufactured goods must be imported, since wood or iron, copper or brass, silver or gold are not found for that purpose, together with the extra cost of living and consequently higher wages, will necessitate the importation of the large proportion of the articles in common use for many years. Now these will be imported from the market which can produce them the cheapest. Therefore, Ontario with her unlimited cheap power, her boundless resources in raw material and her freedom from extreme heat or cold, enabling continuous work, should certainly put the producer on an equal if not better footing, than other nations to compete for this tremendous business of the future great West. The western farmer for the present is occupied in growing wheat, and after the wheat is sold, in having a good time. This year I believe the prosperous times have developed a fondness for motoring, and in consequence large numbers of automobiles have been purchased chiefly from the States. Why should not Ontario make these machines ? I believe they can, but the maker must take them to the people who want them.

Ontario in the course of a few years, must as a natural consequence look for other markets than the supply of her own people, because the inevitable accumulation of wealth must have its earning power sustained. Large towns and cities are growing and being developed ; each require financial assistance, in exchange for which they are willing to give their bonds. These are good investments for the large surplus Ontario Land Surveyors find themselves encumbered with every year.

Ontario has the satisfaction of knowing that the influence and refinement of her educational institutions have had a large part in the formation of the thought and principles of the West. The leading men were to a large extent educated here, and it is gratifying to note that our young men and women are taking a prominent part in the upbuilding of that country. Not only in the educational institutions, but they are met with in all walks of life, and especially the advantage of the training received at the Guelph Agricultural College is making itself felt in every community where one of these graduates is located. Ontario cannot hope to be the only ource of education and refinement very long, for as you all must know, each of the Western Provinces are building universities, colleges, Normal and High schools and first class Public Schools—whose professors and teachers generally are from old Toronto University and other Ontario schools. Among the men from Ontario who are contributing brains and character in the Government of Alberta are Attorney-General Cross and Hon. Duncan Marshall, Minister of Agriculture, and for the House of Commons, W. H. Bennett, K.C., and C. A. Magrath, D.L.S.

Many instances might be recalled where the discipline of early life in Ontario has had its fruition and culmination in the West, ambition and energy being only required to bring such men to the front. Among the men of our profession there are only a few with the ambitious desires of the man who would dwell in the public eye. There are a few instances where the position has been honored by having one of nature's noblemen occupy it. Men whose pure and noble lives have been nurtured in the forests of Ontario after being fairly started by the advice and encouragement of those tried and true men of the Board of Examiners for Ontario Land Surveyors. I might be permitted to refer to the banking and financial institutions established there, to a great extent manned by men trained here, and who when they go West take with them all that is best of that training, and as a rule leave the vices behind them.

Another feature in the West in which the interest of Ontario should be very great, that is—the kind of people with which it shall be filled and dominated. There are some who have formed the opinion that it matters not with what kind of people the West is filled, because the experience has been that by the time they have lived there long enough to become citizens they are proud enough of their new home to call themselves Canadian. Law and order is the rule, and so much more so than in their former homes that the foreigner cannot help noticing it, and even those coming from the States wonder at the safe conditions in so new a country. This must be largely attributed to that band of loyal men—the Royal Northwest Mounted Police, who faithfully, but not offensively, patrol that country and see that the laws are obeyed. Here again an Ontario man is found in Inspector Jennings, a son of our respected City Engineer, taking his duty, at present on Herschell Island; but wherever it calls. I am of the opinion though that it is of vital interest to Ontario that her sons and daughters should be distributed through that great land that the influence of the West in the councils of the nation may be national and not sectional, for the older part of Canada must awake to the fact that a larger proportion of the representation in Parliament will eventually come from the West than the East, and that using a homely saying, "The West has been the tail of the dog, and the dog has wagged its tail, but the time is coming when the tail will wag the dog."

Ontario's loyalty to British connection, her generous support of all reforming influences, her freedom from class legislation or class distinctions, with her unbounded confidence in the belief that the English-speaking people of the earth shall dominate the world for good. These I say are the principles with which her sons and daughters have had their minds and hearts filled, and who can estimate the value to the West, these young people will be developing under their ennobling influence, who will doubt that the people of the West will be more or less tempered by them. It may give us some idea of that force when we consider that there were forty thousand of Ontario's sons and daughters who with their children came to visit their friends here in December. Besides there were many sons of Ontario who came to marry and take back with them sweethearts left behind two or three years ago, and taking with them sisters to marry in the new land ; each helping to develop the country on the lines on which they were brought up.

I met eighteen families of well-to-do Ontario farmers last summer going in with ox teams to settle in that country. They located on prairie lands a few miles east of the British Columbia boundary, and near the Peace River. One of their first acts after locating was to assist in having a church and school established. knowing that without the worship of the God of their fathers their efforts to succeed would be unavailing.

Like the old British fathers and mothers who sent their children into all the corners of the earth, and whose law-abiding characteristics have influenced all peoples, may Ontario, knowing her people are true and faithful to right principles, send them forth to direct and influence the West, especially now in its process of formation.

You are all more or less familiar with the active work of the Laymen's Missionary Movement, and that its main object in furthering the missionary cause is to Christianize the heathen, so that these vast hordes, instead of banding together to destroy the civilized countries, may receive with their absorption of our civilization the higher ideals which Christianity fosters, and by its influence insure the peace of the world. The accumulation of money with so many people has become the ruling passion. Let us not forget that we pray, "Thy Kingdom Come," and that soon, therefore, the better the citizen becomes over all the world, the sooner we may hope that the long-wished for time will come.

Discussion.

Mr. Niven—Mr. Chairman, I have much pleasure in moving a hearty vote of thanks to Mr. Selby for his paper, and I move that it be published in our report. I think it would be well if it were published in more than our report. I think a paper like that, or the principal part of it, if it got into one of our daily newspapers, would be an advantage to this Province. The importance of what he has said there to the manufacturers of this Province is something that is well worth considering. I would be very much pleased indeed to see it published in our newspapers.

Mr. Fullerton—Mr. Chairman, I have very much pleasure in seconding Mr. Niven's motion. The motion was carried.

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WATER POWERS ON OUR NORTHERN SLOPE TO JAMES BAY, PROVINCE OF ONTARIO.

BY L. V. RORKE, D.L.S.

In attempting to get together some information and results with reference to the water powers on the rivers of Northern Ontario, which empty into James and Hudson Bay, a certain amount of latitude must be granted because of the lack of accurate information with respect to the different data, which necessarily enter into a fine computation of any water power development. Having travelled over some of these rivers from their head waters to the outlet, and taken some cursory notes, the writer feels that the impression gained and the results herewith obtained from a summary of these water powers, may be of interest to most of our members in this progressive age of hydro-electric development.

Looking over the map of Northern Ontario you will notice that the rivers north of the watershed to James Bay assume a tentacular aspect with delicate feelers reaching out from the main body of water (Hudson's Bay) to taste of the large bodies of fresh water, which form the head water lakes. Visit the ground and you find them great feeders, raging torrents in high water, with no sense of delicacy toward their surroundings. You may also notice the absence of lake expansions, so prevalent on the southern slope. If it were possible to show every little creek, stream and brooklet it would be seen how wonderfully systematic and complete nature has provided these small laterals to the larger water courses. If you travel up these rivers when your canoemen hug the shores to keep from the heavy current and to take advantage of the back eddies, you will notice the numerous small natural drains in quick succession, especially through the great clay belt, which you would pass unnoticed if travelling in mid stream. The rivers are in many respects similar, in the lower reaches they become wide, shallow and swift, after tumbling down over what has been termed the Archean Boundary by geologists, where an altitude of approximately 250 feet in a distance of from 5 to 15 miles, is overcome by a series of falls and rapids. The principal falls on each river at this Archean Boundary are as follows :—On the Missinabi, at the end of Long Portage, at what is known as "Hell's Gate," a fall and rapid of 140 feet ; on the Opazatika, at Break Neck Falls, a drop of 60 feet ; on the Mattagami, at the Long Portage, falls and rapids of 150 feet ; on the Abitibi, the long rapids between the mouth of little Abitibi River and New Post, and on the French River tributary Nettogami, at Kawash Falls, 110 feet.

Above this Archean Boundary there is less current in the rivers, and the basin is coursed by a succession of falls, chutes and rapids with intervening stretches of river, whose velocity varies from one-third to two miles per hour. The large lakes at or near the head waters are fairly uniform in altitude, being approximately 1,000 feet above sea level, and may be enumerated as follows :—The Abitibi Lakes on the Abitibi River, the Frederickhouse and Night Hawk Lakes on the Frederickhouse River, the Mattagami and Kenogamisee Lakes on the Mattagami River, Pish-kan-og-am-a, Matagaming and Rice Lakes on the Ground Hog River, the Missinabi, Kapuskasing, Opozatika, Kabanikagami, Kenogami and Ogoki Lakes at or near the heads of the respective rivers of the same name, Rainy Lake, Lake of the Woods and Lac Seul at the head waters of the Winnipeg River, and its tributary, the English River.

The drainage basin of these several rivers within the limits of the Province of Ontario is approximately 100,000 square miles. The altitude of the head waters and length of rivers being approximately the same, and the river beds having a fair degree of uniformity, I propose to make certain deductions and arrive at some conclusions as to the amount of water power in the larger falls on these respective streams.

Every water power estimate must be calculated to be accurate on its own merits, taking into consideration the annual water flow and its superficial surroundings, the natural head varies with the flow, and the flow varies with the temperature and rain fall, from month to month, in fact the only constant is the drainage basin, which remains always the same, unless the water is diverted by artificial means from its natural course, or by earthquakes, of which we know little by experience in this country.

The greatest error in making an estimate is always in gauging the volume of flow ; a single measurement of a stream is of no value except as to that particular time. A close estimate can only be made by a series of measurements extended over the whole year, not only of the volume discharged over the fall, but also of any lakes required for storage basins.

In drainage area calculations, the amount of run off as compared with the total rain and snow fall must be known. This percentage will vary with the conditions of the atmosphere, the quality and chemical composition of the soil and the grades of the valleys, hills and plains which comprise the entire drainage basin. From information to hand in this respect a fair and conservative deduction of the volume of flow in these rivers can be arrived at by assuming a constant number of cubic feet per second discharge to each square mile of area drained. The drainage area and head waters of the Ottawa River adjoin some of those herein enumerated, and has been carefully gauged and investigated in connection with the Georgian Bay canal scheme, with the following results :

The average annual precipitation for ten years preceding 1906 was 31.72 inches, and the average discharge 53 per cent of the precipitation, or 16.8 inches.

The drainage area is 56,000 square miles, and for the same ten years the average yearly mean discharge was 56,641 c.f.s. The maximum high water discharge three times the mean discharge, and the minimum low water discharge 65-100 of the mean discharge. The results obtained from this discharge area are that the mean discharge is 1 c.f.s. per square mile area, and the minimum low discharge is .65 c.f.s. per square mile area.

The Spanish River has been estimated to have a minimum discharge of 1,800 c.f.s. and 3,500 square miles area—.51 per square mile.

The Mississagua River	1050	c.f.s.	and	3500	sq.	Miles	area	.30
The Sturgeon River	900	“	“	2000	“	“	“	.45
The English River	8000	“	“	20000	“	“	“	.40
The Winnipeg River	20000	“	“	50000	“	“	“	.40
The Montreal River	750	“	“	1500	“	“	“	.50
The Trent River	1600	“	“	4000	“	“	“	.40

The average minimum discharge of these rivers is .46 c.f.s. per square mile, and for the purpose of this paper it will be well within the limits to assume 4-10 c.f.s. per square mile.

On the western part of the slope, the total precipitation is less than in the Ottawa River basin, but the percentage of run-off is greater. The average yearly precipitation during ten years in the Winnipeg River basin has been 23 inches, and the run-off 70 per cent. of the precipitation, or 16.1 inches, practically the same as the Ottawa River basin.

In these rivers of our Northern Slope, the high water run-off is more gradual than on the southern slope. In such rivers as the Nepigon, Magpie, Pigeon, Spanish, French and others emptying at the north shores of Lakes Superior and Huron, the spring freshets are heavier and of shorter duration, because of the large amount of rock-exposed territory and the more broken and steep hills therein. The maximum discharge is not reached on the northern slope until late in the month of May or early in June, and owing to the gentler slopes of the land and the forest covered area, the run-off is more gradual. Taking this into consideration the annual discharge can be more easily and uniformly controlled and requires less storage than such rivers as mentioned above.

On the Abitibi River, for example, we have a storage basin of 460 square miles in the Abitibi, Night Hawk and Frederick House Lakes, with a rise of 10 feet above low water mark (one square mile one foot deep—.88 c.f.s.) a storage of 4,000 c.f.s. could be obtained to maintain a mean discharge during the low water months, this is quite sufficient after allowing a reasonable percentage for evaporation.

A cross section of the Abitibi River, near the National Transcontinental Railway crossing, gives an area of 5,000 square feet below normal water level and 10,000 square feet in mean high water. The water from an area of 6,500 square miles discharges through this sectional area, in low water at the rate of one-third of a mile per hour, in high water at the rate of 1¼ miles per hour, a calculation based on the principal that the low flow is .4 c.f.s. per square mile, and the mean high water 3 c.f.s. per square mile.

From this cross sectional point, which is 800 feet above sea level,—after deducting 280 feet in the falls and rapids, which are noted, and 200 feet for the lower reach of the river, where a uniform fall of probably two feet per mile exists,—there remains a fall of 320 feet in a distance of 200 miles, or about 1 6-10 feet to the mile. This of course includes many minor rapids, which, when estimated, would reduce the uniform river velocity to probably what is deduced from the above sectional discharge.

It has been ascertained that on the Winnipeg River, in the Province of Manitoba, an aggregate head of 247 feet is available for horse power development, with a minimum efficiency of 486,000 horse power, which is equal to one-fourth that of the great Canadian Falls at Niagara. It may be of provincial interest to state that 75 per cent. of the drainage basin of this grand river lies within the Province, and 95 per cent. of the total discharge passes through the Province before reaching the outlet into Lake Winnipeg. With control dams at Lake of the Woods, Rainy Lake, Lac Seul and other large lakes on this river and its tributary, the English River, the minimum efficiency of all powers on this river, both within and without the Province, could be doubled.

The large water powers in Ontario on this river are enumerated herein, giving the same minimum low water flow per mile as those on the more eastern end of the slope. The White Dog Falls and Rapids, about 15 miles below the N. T. C. Railway crossing, is the 3rd largest water power in the Province, Niagara being the largest and Sault St. Marie Rapids the second largest.

In compiling this aggregate estimate the error is a minus quantity. Many rapids on these large rivers are not noted, and many falls on the smaller tributaries, such as the French, Little Abitibi, Muskego and Wabigoon Rivers, which will develop from 500 to 5,000 horse power, do not figure in this total, neither is the water power on the River Albany, which at the present time forms a portion of the northern boundary of the Province and has a drainage basin of about 50,000 square miles, included. The margin will be quite sufficient to balance the loss in converting from theoretical to practical horse power, the loss in transmission of energy to points within reasonable distance, and all other losses which accrue between the water power in its natural state and the manufactured article by means of that power.

As to the ultimate development and disposal of this great amount of water power, it is not within the limits of this brief paper to conjecture, suffice to say that it is all within a distance of 100 miles from railway facilities, and thus can be transmitted without too great a loss even at this date, to meet the raw material at shipping points, and in years to come when these water powers have been harnessed and put under man's control, subjective to the will of Providence, I believe the results will fully substantiate these figures.

The following tabulated list of water powers are calculated on the drainage area basis as described.

The natural head in feet as given in the second column is obtained from different reports by surveyors, geologists, explorers and others, and although not always accurate in measurement, are reliable.

The drainage area as given in the third column is fairly well defined on the maps of Northern Ontario.

The estimated minimum flow as given in the fourth column means the minimum amount that can be counted on every day in the year without increasing the natural head and without storage. The minimum amount of horse power that this will develop is given in the sixth column.

The volume of water under controlled storage sufficient to maintain the mean discharge of 1 c.f.s. per square mile area is given in the fifth column, and the amount of horse power that this will develop is given in the seventh column.

WATER POWER.	Natural Head in feet	Approximate drainage basin area in sq. m.	Estimated minimum flow c.f.s.	Est. mean discharge under controlled storage c.f.s.	Minimum 24 hour h.p. under natural flow	Minimum 24 hour h.p. under discharge control	Total h.p. on rivers
ABITIBI RIVER							
Koochiching Falls and Rapids below	50	5,000	2,000	5,000	11,000	28,000	
Iroquois and Buck Deer Falls	20	6,000	2,400	6,000	5,400	13,500	
Long Sault Rapids ...	75	6,500	2,600	7,500	22,000	55,000	
Kettle Falls and Rapids	10	7,000	2,800	7,000	3,200	8,000	
3 Carrying Rapids ...	25	9,500	3,800	9,500	10,600	26,500	
Lobstick Rapids ...	15	9,500	3,800	9,500	6,400	16,000	
Series of Rapids above New Post	100	11,000	4,400	11,000	49,600	124,000	
Otter, Sextant, Coral and Long Rapids ...	60	12,000	4,800	12,000	31,000	77,500	
Tributary BLACK RIVER							
McDougall's Chute ...	14	800	320	800	500	1,260	
FREDERICK HOUSE RIVER							
High Falls, Mann Tp....	40	1,000	400	1,000	1,800	4,500	
Falls and Rapids Lot 12, Cons. 4 and 5, Tp. Mann	30	1,000	400	1,000	1,350	3,400	
Rapids on Lots 11 and 12, Con. 5, Tp. Fournier	12	1,200	480	1,200	650	1,640	
	451						359,300

WATER POWER.	Natural Head in feet	Approximate drainage basin area in sq. in.	Estimated minimum flow c.f.s.	Est. mean discharge under controlled storage c.f.s.	Minimum 24 hour h.p. under natural flow	Minimum 24 hour h.p. under discharge control	Total h.p. on rivers
MATTAGAMI RIVER							
Kenogamisee Falls and Rapids	40	1,000	400	1,000	1,800	4,500	
Wawatian Falls... ...	60	1,000	400	1,000	2,700	6,700	
Sandy Falls, Mount Joy Tp.	50	2,500	1,000	2,500	5,600	14,000	
Sturgeon Falls, Mahaffy Tp.	16	3,500	1,400	3,500	2,500	6,300	
Yellow Falls, Bradburn Tp.	18	3,500	1,400	3,500	2,800	7,100	
Island Falls, Bradburn Tp.	17	3,500	1,400	3,500	2,700	6,700	
Smooth Rock Falls, Kendry	22	4,000	1,600	4,000	4,000	10,000	
Fish Rapids	15	4,000	1,600	4,000	2,700	6,800	
Cypress Falls	20	4,500	1,800	4,500	4,000	10,100	
Devil's Falls	12	12,000	4,800	12,000	6,400	16,200	
Little Long Falls and Rapids	80	12,000	4,800	12,000	43,200	108,000	
Great Rapids, Long Portage	100	12,000	4,800	12,000	54,000	135,000	
Grand Rapid	40	12,500	5,000	12,500	22,000	56,800	
Long Rapid Fall ...	150	12,500	5,000	12,500	85,200	213,000	
Forks Falls	10	12,500	5,000	12,500	5,700	14,200	
Tributary							
KAPUSKASING RIVER							
Series of Falls and Rapids South of Niven's Base Line aggregating	80	3,200	1,280	3,200	11,500	28,800	
GROUND HOG RIVER							
Series of Falls and Rapids South of Niven's Base Line	100	4,400	1,760	4,400	19,800	49,600	
	830						693,800

WATER POWER	Natural Head in feet	Approximate drainage basin area in sq. m.	Estimated minimum flow c.f.s.	Est. mean discharge under controlled storage c.f.s.	Minimum 24 hour h.p. under natural flow.	Minimum 24 hour h.p. under discharge control.	Total h.p. on rivers.
MISSINABI RIVER							
Brunswick Rapids ...	10	2,500	1,000	2,500	1,000	2,600	
Green Hill Rapids ...	10	2,500	1,000	2,500	1,000	2,600	
St. Peter's Falls... ...	15	3,000	1,200	3,000	2,000	5,100	
St. Paul's Falls	20	3,000	1,200	3,000	2,700	6,800	
Albany Rapids	10	4,500	1,800	4,500	2,000	5,100	
Beaver Portage	12	5,000	2,000	5,000	2,700	6,800	
Sharp Rock Falls ...	10	5,000	2.000	5,000	2,200	5,600	
Crow Rapid	17	5,500	2,200	5,500	4,200	10,500	
Island Chute	10	5,500	2,200	5,500	2,500	6,200	
Tom King and Kettle Rapids	20	6,000	2,400	6,000	5,400	13,600	
Conjuror's Chute and Hell's Gate	250	6,500	2,600	6,500	73,800	184,600	
Tributary OPAZATIKA RIVER							
Breakneck Falls and Rapids above	150	2,500	1,000	2,500	17,000	42,600	
	534						
							292,100
KABINAKAGAMI RIVER							
1st Outlet Falls ...	35	1,000	400	1,000	1,600	4,000	
2nd Falls and Rapids ...	25	1,100	440	1,100	1,200	3,000	
3rd Falls and Rapids ...	15	1,200	480	1,200	800	2,000	
4th Falls and Rapids ...	20	1,400	560	1,400	1,200	3,000	
5th Falls and Rapids ...	40	1,500	600	1,500	2,700	6,800	
6th Falls and Rapids ...	12	1,600	640	1,600	800	2,200	
7th Falls and Rapids ...	25	1,700	680	1,700	1,900	4,800	
8th and 9th Falls and Rapids	18	1,800	720	1,800	1,400	3,600	
10th Falls and Rapids...	30	2,000	800	2,000	2,700	6,800	
11th, 12th and 13th Falls and Rapids ...	75	2,100	820	2,100	7,400	18,700	
14th Falls and Rapids ...	10	2,300	920	2,300	1,000	2,600	
15th Falls and Rapids ...	17	2,500	1,000	2,500	1,900	4,800	

WATER POWER	Natural Head in feet	Approximate drainage basin area in sq. in.	Estimated minimum flow c.f.s.	Est. mean discharge under controlled storage c.f.s.	Minimum 24 hour h.p. under natural flow	Minimum 24 hour h.p. under discharge control	Total h.p. on rivers
KENOGAMI RIVER							
Kenogami Falls... ...	25	1.000	400	1,000	1,100	2,800	
3rd Portage Falls ...	25	1,500	600	1,500	1,700	4,200	
7th Portage Falls ...	32	1,800	720	1,800	2,600	6,500	
10th Portage Falls ...	12	2,300	920	2,300	1,200	3,000	
11th Portage Falls ...	70	3,500	1,000	2,500	8,000	20,000	
	486						
							98,800
OGOKI RIVER							
Amy Falls	30	8,000	3,200	8,000	10,800	27,000	
Rapids Below Amy Falls	10	8,000	3,200	8,000	3,600	9,000	
Burton's Falls... ...	50	12,000	4,800	12,000	27,200	68,000	
Rapids Above mouth of Whitefish River... ...	50	12,000	4,800	12,000	27,200	68,000	
							172,000
ALBANY RIVER							
Burton's Falls	30	12,000	4,800	12,000	17,800	44,600	44,600
	170						
WINNIPEG RIVER							
Koochiching Falls ...	23	14,000	5,600	14,000	14,400	36,000	
Kenora Falls	18	27,000	10,800	27,000	22,000	54,000	
White Dog or Islington Falls	50	27,500	11,000	27,500	62,000	155,000	
	91						245,000

Tributary

ENGLISH RIVER has a drainage basin of 22,000 sq. miles with minimum flow of 9,000 c.f.s. at outlet. The several large rapids and falls on this stream up as far as the N.T.C. Railway crossing where the minimum flow is 3,200 c.f.s aggregate a total head of 150 feet, which will give a minimum efficiency of 125,000

GRAND TOTAL 2,030,600

(This Association is not responsible as a body for the opinions expressed in its papers by Authors).

FISH AND GAME PRESERVATION IN ONTARIO.

BY KELLY EVANS.

Mr. Chairman and Gentlemen—I notice I am down on the programme to read a paper this evening. I never read a paper. I always endeavor to speak extemporaneously, and with your kind permission I will endeavor to give you some information and some suggestions in reference to the Province of Ontario. In the first place I may say as a matter of privilege, that I deem it a very unusual pleasure for me to have the honor of addressing this Association, and while some of you may not be aware of the fact, in a sense I have the honor of having an intimate connection in the past with this Association. It so happens my great grandfather was the first Surveyor General of the Province of Ontario, Col. Chewitt, and, further, I do not speak to you as a man absolutely unacquainted with the lives you lead, as for some four or five years of my life I practised as a civil engineer very largely upon exploratory surveys, so that I am quite aware of what a transit and level means, what eating salt bacon means, and what fighting mosquitoes and black flies means.

Now, gentlemen, before I commence my remarks I would like to take this opportunity of drawing your attention to what may be deemed the great policy before the people of this Continent to-day, namely, the conservation of our natural resources, and in doing so I propose giving you information of which you may already be aware. When I touch upon how this policy of conservation was started you will recollect a, comparatively speaking, short time ago, the late President of the United States, Theodore Roosevelt, called together the Governors in each and every State in the Union with the idea of taking stock of the resources remaining in the United States, and to determine what steps should be taken to endeavor to conserve them. This extraordinary meeting took place at Washington, and the main basic formula that was drawn up was that the resources of the country should, as far as possible, be governed in such a way that they would give the greatest amount of use to the largest number of people, and last for the longest possible time. Following that, the President called together representatives of Canada and Mexico to confer with the representatives appointed by this first meeting of the United States, and certain basic propositions were again ventilated, and following this second meeting the Conservation Commission of Canada was formed by the Dominion Government. The first meeting of that Commission took place at Ottawa some weeks ago, and was considered sufficiently important by the Globe newspaper to report Mr. Clifford Sifton's inaugural speech verbatim, a thing the Globe had not done for some seven years. It occupied some twelve columns of space in the Globe. I had the pleasure of being present and hearing that address, and in my humble judgment it is the most important utterance of a public man in Canada since the day Sir John A. Macdonald announced the National Policy, and it is something that I think each and every one of us should study and should master, as it gives in concise form the whole of this great question of the conservation of our natural resources.

I was honored by Mr. Clifford Sifton in being asked to address the Commission on the proposition of game and fish in the Province of Ontario, and I am glad to say that following my remarks it was moved and carried that instead of the Committee on Fisheries, which had already been formed by the Commission, that Committee was changed to read, "The Committee on Fisheries, Game and Fur Bearing Animals," so that the Conservation Commission has officially recognized game as of sufficient importance to be deemed one of our great natural resources.

I will now endeavor to give you a few points on game, that is the value of game from its commercial aspect as an attraction to tourists. Now, if any of you called on Mr. Byron F. Walker and asked him to give you statistics in this Province, of the cereals, of the dairy products, of the minerals, and of the timber, I have no doubt in a very short time he could give you all the information required, from the books he has at his disposal, but if you asked him to tell you what the actual monetary value of the tourist traffic to the Province was, I am perfectly convinced he would not be able to give you any information whatever, and yet to-day the value of that tourist traffic is very considerable, it is rapidly increasing, and by proper attention to our fish and game it can be made very much greater still. You have seen from time to time accounts in the newspapers in reference to this tourist traffic, but I am going to give you first hand some figures that are absolutely beyond the venture of a doubt. We fortunately have on this Continent one particular State in which great attention has been paid to the matter of tourist traffic. I refer to the State of Maine. Now, in the year 1860, gentlemen, there was practically no fish or game in the State of Maine, and so bad had the condition become that the Government of the day appointed a commission to examine into and report to the Legislature upon the then existing condition of the game and inland fisheries of the State, and that Commission reported that the inland fisheries of the State were absolutely valueless, that there were no moose whatever in the State, and that they could only find deer in one small portion of it. Following that report some very stringent laws were passed, put on the Statute Book and attempted to be enforced, with the result that of the first five or six game wardens who were appointed, three of them were murdered, two shot down by one man in cold blood, and that man is in the State prison at present. But this attempt to defy the Legislature only made the Government more determined that the regulations should be enforced. The results have been astonishing, and from a condition in 1860, when these assets of the State were practically valueless, we find the following condition in the year 1905. In 1905 to set at rest the discussion that was taking place as to whether or not the tourist traffic amounted to a very large sum in the State of Maine, the Legislature determined to take a summer census of the number of persons coming into the State, attracted by, presumably, the fishing and shooting. Canvassers were sent through the whole of the interior portion of the State, and a house to house, hotel to hotel, and camp to camp census was taken, with the names and addresses as far as possible of the persons who came into the State, and when the figures were turned in to the Legislature the people were perfectly astonished to find no less a number than 133,885 people had come into the State that year. The people of the State have arrived at a basic figure on which they calculate. They estimate each and every person, on an average, who comes into the interior portion of the State will leave $100 in the State from the time he reaches the border line until the time he leaves it ; and I think, gentlemen, if you consider the matter you will think this is a very conservative conclusion. If you will take into consideration the railway fare, the hotel bills, a guide at $3 a day, and other expenses, and that he remains from one week to two or three or four weeks, very few of them will get off with $100. But, assuming $100 as the basic figure, you get an indirect revenue enjoyed by the State for that year of nearly fourteen million dollars. Now the State of Maine is only one-eighth of the size of the Province of Ontario, and is not as efficiently watered as our Province is.

In 1907, in order to get certain figures to write an article, which unfortunately I have not had time to write, I wrote to the Hon. L. T. Carleton, Commissioner of Maine, and asked him to give me th present figures, and he replied and said the Government were very well satisfied with the return of 1905 ; they had no further figures to give me officially, but he was taking the matter up with Col. Boothby, the General Passenger Agent of the Maine Central Railway. It is perfectly reasonable that the Fish and Game Commissioner, being very enthusiastic over his subject, might exaggerate figures and attempt to prove to the people that more money was coming into the State than really was practicable, but I think you will all admit that of all the unsentimental, cold-blooded business men, railway men are the worst, and Col. Boothby wrote that from statistics in the possession of his railroad, and from other statistics he had had the opportunity of examining, he was positively convinced that in the year 1907 at least 250,000 people came into the interior portion of the State of Maine, and in his opinion the main attraction bringing them there was the good fishing and shooting provided by the State.

Now, if you take the $100 basis you get the gigantic sum of twenty-five millions of money. That is a very large sum, and I want to point out the peculiar thing about that money, and that is its extraordinary economic value. Now, if the Province of Ontario received twenty-five million dollars of money in that way, without giving up a stick of timber or a pound of mineral, it would mean really the great resources of other States and of other countries turned into gold and brought and left here, for which we only give, after all, as it were, an amusement.

To go farther afield for another illustration of what this distribution of money means take Switzerland for instance. It is a very small country, as you all know, and it practically lives on the tourist traffic. I saw a book the other day, a book of about half an inch thick, and all down the margin on each page was a narrow border of an inch and a half wide, and from six to ten hotels were on each and every page of that book. I just skimmed over the leaves, and I came to the conclusion there must have been over a thousand hotels. These hotels are filled during the season to overflowing, and that represents an immense expenditure of money. What brings the people there ? Simply the beauty of the mountains and the climate. They bring the money that is earned from the resources of other countries and leave it there. The same thing in Italy. Millions of pounds are brought into Italy from England and millions of dollars from the States by people who go over there attracted by the historic association, by the abundant and beautiful scenery, and by the soft Italian skies and twilight.

Now, how can we get it here ? A recognition by the people of fish and game as an attraction to the tourist is very much more valuable than fish and game as a food. The Hon. L. T. Carleton calculates that a moose running alive in the State of Maine is worth to the State $500. The same moose dead is worth comparatively a trifling sum as food. That is the principle on which to view the situation.

Now, what have we done for these resources in the Province of Ontario ? We come of a stock who originally settled this country, and in the first years were to a certain extent dependent upon the fish and game to eke out their existence, and the instinct of sport is undoubtedly bred in the Anglo Saxon race. Our forebears who settled the country had come from England, Scotland and Ireland very largely, where game was protected and was the property of the few, not of the many, and they undoubtedly valued the great privilege they had in this country of sport on all sides, and that feeling has been passed down from the past to the present. In the past there were such immense quantities of fish and game that there was no necessity for any conservation of it, but the day having now come that there is an undoubted necessity for that conservation, it is very difficult to get the people to see that necessity and to obey the sumptuary laws that have been passed from time to time.

I have been placed upon the programme to speak upon game alone, but I think you gentlemen who know the back country of this Province probably very much better than I do, and certainly very much better than the masses of the public know it, realize that the fish in this Province is probably more important from the point of view of the tourist traffic than is the game, for the reason that fish can be taken during a very long season, whereas the game, according to our laws, can be taken only in a very short season, and that season more or less in the inclement time of the year. So that the fish of our Province are probably more valuable economically than the game.

Now, gentlemen, in the hands of those of you who go into the back country and into the north land—in your hands is a great power, and you have a great responsibility. Your association is composed of highly educated, scientifically trained men. When you go afield into the back country you run across the settler, the man of, comparatively speaking, no education, and that man undoubtedly looks up to you. The very sight of the instruments you carry impresses him ; the statements that you make he takes as the statements of the man who knows more than he does, and you have an opportunity of performing, I take it, a great public service. You may say it is not your business to bother with the question of game protection for this Province, but you certainly are all interested in anything that will tend to the greater prosperity of the Province and the bringing to the Province of greater sums of money, as some of it naturally must come back to yourselves. The question of fish and game protection is not a question of sumptuary laws, it is a question of the education of the people. If we wish to carry out fish and game protection as it should be carried out, we cannot do it merely by placing laws upon the Statute Book. We must educate the people. How can we best do it ? You gentlemen going through this back country, by simply explaining to the people these very facts I have given you in reference to the tourist traffic may do a great deal. When I tell you in the little State of Maine there are over 2000 registered guides who receive annually an average of quite $300 a year each you will realize what an opportunity our back country men have of making money in this way, once the tourist traffic commences to stream into our back country. So that if you occasionally, when you have an opportunity, would show the people that game running wild in the woods is of greater value to them from the point of view of eventual service as guides than it will be simply slaughtered for food ; and very often, as you know, much of it is not used but left to rot in the woods ; in carrying on that propaganda you will undoubtedly be doing a great public service.

Now, gentlemen, game, I take it, is of value to you from another point of view. Many of you have been frontiersmen ; you have had to use game, and it has been of great assistance to you from time to time. I cannot say I have ever been in a position of starvation, but I have had the experience where a little bit of fresh meat has been of great value to the party. So that if any of you have found that in your past experience, you will feel that game has helped you through a tight corner on some occasions, and therefore you owe something to the game of the Province, and should assist, as far as you can, in any way in improving the condition of things.

Why should any of you perform a public service ? This question of public service I think is peculiarly interesting to you. You do not belong to a profession out of which any of you are going to become millionaires or very rich men ; you are professional men occupying a position of great importance in the development of this great Province and of this country, but you do not belong to a profession that is going to make you enormously rich men. But, after all, I take it that wealth is not everything, and that a man in performing some little service that might be called a public service is doing his best duty as a good citizen of the State, and therefore I appeal to you gentlemen to help as far as you can from time to time in this way in advancing this question of the protection and conservation of the fish and game interests of the Province.

Another argument in favor of your taking that attitude is the point of view of the public health. We all must admit that those who live in the larger centres of the community in this Province are very often too much indoors, in the factory and in the office ; they do not get the same opportunity that the backwoodsman does of breathing in the real good air of the back woods, and any attraction we can find to bring the people of the city out into the country is good for the public health. Take the young man just leaving his college or university, is it not very much better for him to go back into the back woods, say of the Province of Ontario, face to face with nature, out in the great woods and on our splendid waters, than to go down to Narraganset Pier and engage in a whirl of dissipation ? There is no doubt about it that life in the open is the best thing in the world for the city boy. You gentlemen know what it is, and many of you get a good deal of it, but the average clerk, the average office man, the average barrister, and the average doctor does not get it ; he is toiling in the city. Now, if you have no attraction to offer, to bring him out into the woods, he is not apt to go there. So that by any help you give to conserve the attractions that the woods and waters have in them, you are doing good to the body politic, and it is well worth your while doing so.

If you believe that the values I have given you in regard to the State of Maine are all correct, perhaps you will say, "Well, they have a peculiar advantage over us; how are we to get such a great amount of tourist traffic?" Let me tell you, we are, in a sense, more advantageously situated than the State of Maine is. Within practically one day's journey of some of our fishing regions in the Province of Ontario there lies a population of thirty millions of people. The vacation habit, as they call it in the States, is growing very rapidly, and it is not only the very rich who wish to take a holiday each year, but it is the comparatively well off, well-to-do people. Let me give you some figures of what we are getting to-day in the Province of Ontario. Some three years ago we managed to get placed on the Statute Book of the Province of Ontario what is known as the Non-resident Angler's Tax of $2. Those who agitated in favor of that law did not do so with the view of providing revenue for the Province, yet we received from that source last year in the neighborhood of $18,000. I have no doubt that Col. Matheson was very pleased to add that to his Budget. The $18,000 did not mean much after all, but it did one thing, it showed what I hope we will soon have further statistics to prove the value of, this resource of the Province. We have got even now something definite to point out. We have got $18,000 in two dollar bills. That meant that 9,000 people came into the Province last year admittedly to fish. Using the basic figure of the State of Maine, there is an indirect revenue from that source certainly of $900,000, practically a million. Now, gentlemen, I think the Department itself would admit that they did not collect it all. My own impression is they did not collect more than 50 per cent. of it. Remember, the Statute has only been on the books for three years; it is not yet in some portions of the Province apparently, understood. Unfortunately some of the subordinate officers are perhaps not advised of its importance sufficiently, but undoubtedly we have not collected it all. If we assume we have only collected 50 per cent. of it we should have about twice the amount shown; and recollect, that every man that paid that $2 did not come alone; some of them brought their wives and families. It represents a very much greater number than 18,000 people. From information I have been able to gather from conversations with railroad officials, hotel men, and from other sources, I am of the opinion that, last year, in indirect revenue to the Province of Ontario, it would mean between three and five million dollars. Now, gentlemen, Cobalt did not turn out such an immensely greater sum than that after all, and, remember, we gave very little for that three to five million dollars of money. Go and ask Mr. Henry Winnett of the Queen's Hotel, the oldest hotel man in Canada, what he thinks of the tourist trade and how it is affected by the fish and game attraction in this Province, and you will be perfectly surprised at what he tells you: and ask him what the widening out of that attraction means, and see what he will tell you. He told me the other day that each and every year now there are old customers of his who have been coming for ten, fifteen, or twenty years to the Province of Ontario and have stayed at his hotel on their way into the back country, and they say to him, "Good day, Mr. Winnett, sorry, but this is our last trip, you won't see me any more." He says to them, "What is the matter?" "Oh well, the fact is, things are not what they used to be; the fishing is all played out; I have tried two or three places, but it is going back everywhere, and I am going now to the State of Maine or to Michigan or some other point." "Now," he said, "I am losing old customers. It is true we are getting new ones, but I like the old customers, and I think it is good business to keep the old customers if you can." Mr. Winnett would tell you that he believes this attraction is of serious business interest to this hotel. Now, the hotel investment in the City of Toronto, as you know, amounts to several millions, and each and every hotel proprietor would tell you just what Mr. Winnett would. Over in Boston about three years ago I heard the Hon. L. T. Carleton, of Maine, speaking on this very question, and he made this statement, he said, in Maine he knew of an investment of three millions of dollars in reference to a big pulp and paper proposition, and he said that two of the directors of that enterprise had assured him that that enterprise would never have come into being, or that investment never have been made had they not been attracted to the State of Maine by the fishing and shooting and seen this chance for this particular enterprise. It is an extraordinary thing that three years afterwards I heard Mr. Wallace Nesbitt, in giving evidence before the Georgian Bay Fisheries Commission down at the Queen's Hotel, state that he knew an investment in Ontario of considerably over a million of dollars, the principal director of which had assured him it would never have been made unless they had gone up there attracted by the moose hunting. Mr. Wallace Nesbitt does not know the

Hon. Mr. Carleton, and never had any communication with him. There is an extraordinary instance of an absolute, direct proof of what this attraction means in the sense of building up a country. It brings in men for sport and relaxation who happen to be capitalists, and who see definitely in front of them an opportunity for the investment of their spare money. There are two instances for you.

I know that a great many people look upon me as a crank and hobbyist. Well, it is perhaps just as well that there are a few cranks if their efforts are going to wake up the people to an asset that has been neglected and forgotten.

I have endeavored in the remarks that I have made to you to emphasize this fact, that the value of the fish and game is not the value to yourselves as sportsmen at all, it is the value to every merchant in the City of Toronto, it is the value to every professional man in the Province of Ontario, it is the value to the whole body politic of the tourist traffic that can be attracted by it. But gentlemen, until lately we have been going along the line that spells the utter annihilation of this attraction. You know it probably better than I do. I don't suppose there is an old surveyor here who does not recollect the conditions, we will say, in the Kawartha Lakes, the conditions along the Trent, the conditions along the Georgian Bay, and the Muskoka Lakes, comparatively speaking, a few years ago, and who does not know what it amounts to to-day. Why has that depletion occurred to both of these resources ? Simply this, that in reference to the fisheries in a broad sense there has been at work that basic principle that has destroyed all our great resources, the selfish few netting what they want, utterly oblivious of the future or posterity, and the apathetic many not caring in the slightest degree. It is inconceivable to believe that our statesmen, or our politicians even, will wilfully allow anything to go on in the country that is going to be injurious to the people at large, but when a strong group of men banded together with capital behind them attack an administration with a view of getting certain concessions, with a view of carrying on a certain enterprise and the public is absolutely apathetic, you may depend upon it that few will have their way. Let me give you an illustration. You all know that the fisheries of the great lakes have reached the point where the auctioneer is saying, "Gone." They have been going, going, and the auctioneer has almost got the hammer up and is going to bring it down with "Gone," and why? Let me tell you. Take Lake Ontario, one of the finest sheets of water in the world; it is capable, properly handled, of providing all the fish that the City of Toronto would ever require even if its population became a million of people. In that lake the white fish have almost ceased to exist. Were they ever in large quantities? They were. The report of the Royal Commission of 1892 shows that fishermen who had fished in Lake Ontario years before, and were fishing then in the Georgian Bay, made statements under oath to the effect that they had seen as many as 90,000 white fish taken with one haul of a net on Wellington Beach. The value of such a catch to-day would run up into the thousands of dollars; it would amount to nearly $10,000 for one haul of a net. Now, I asked Mr. Edward Harris the other day (he took that evidence) how he calculated that such a catch of fish could be practically pulled up on the shore with a seine in one net, and he explained it in this way. They had a net in those days called a "sou'wester": it was an immense net. I suppose you have all seen a seine net pulled. They did not attempt to get the net at once right on the shore; what they did was this: They got the two ends up on the shore, which of course were a long distance apart, and then gradually commenced to pull the under-body up on this beautiful shelving beach, and when they had the net 200 feet out the fish were in such masses that they were crowding in towards the shore of themselves, and they went in with scoops of all kinds and small nets, and gradually took the fish ashore with those small nets; and this man, Albert Hodgins, swore he was present and saw them counted. 40,000 white fish at a haul was not an unusual catch; 10,000 was a common catch. In other words, this Lake of Ontario was almost alive with white fish. You know what the catch is today. I have seen as a boy myself at Toronto Island immense hauls of white fish got in June and July on the beach with seines. What caused this destruction? Several Royal Commissions reported against the destruction. But the reports were never acted upon. Why? The people as a whole were apathetic. It was the fault of those that came before us, their own fault, not the actual fishermen, but the public of the day. Nobody cared about it. What really produced it? Over fishing in the sporing season. There are places in this Province, there are constituencies in this Province, and I am not going to mention where or which, where 250 net fishermen controlled the situation for fifty years—farmer net fishermen. That county had to be won on several occasions. It is not a question of blaming either party. The public was absolutely apathetic. Those net fishermen wished for certain regulations, and they got those regulations, and those regulations spelled immediate returns to those people, without any consideration of what the future might bring about. We all know to-day fish are very high in price, and when you get them they are often cold storage fish. We know they go over to the States, and actually in certain places we buy back fish from the States that were caught in the Province, after it has paid a small American duty, and then it pays a small duty coming back to us again. What has brought that about? It is again a small number of powerful people determined to control that particular enterprise, and the public apathetic. Now, the same thing applies and will apply to the game situation later on, and you gentlemen have a mighty weapon in your hands. You go abroad among the people of this Province. You have an opportunity from time to time of passing on the word, of telling them that these animals at large in the woods are of great use and of greater use as an attraction to the tourist, and it is better to earn, for instance, $3 a day, those men pay good wages, than to go out and slaughter deer, half for amusement and half for food.

One more point, and I am done. Do we not all of us owe something after all to posterity? Do we believe that that old saying, "What would posterity do for me" is a good argument? I take it, not. I think it is the duty of every really good citizen to consider posterity, and again I say you gentlemen occupy a peculiar position. You might bring a thousand people in the City of Toronto together, and you might convert every one of those thousand people to the propositions that I have been endeavoring to convert you to, and that thousand would not have a tenth of the influence that this Association has. If my coming here and giving you this rambling talk, in which I have pointed out a few facts which cannot be denied, should result in a convincing argument to your trained intelligences that you should help in the matter of the protection of the fisheries and game of the Province, I will be satisfied, and I hope and trust you will do what you can. Some of you may be religious men, and to those I would close with these remarks, I believe there is good done, especially to the city dweller, by going afield in the woods and on our great waters. Those of you who have read "Stanley in Darkest Africa" will remember in a portion of the book he notes the fact that those in the party who are not accustomed to reading the Bible seemed to commence to read it; they were impressed unconsciously by the magnitude and the solitude of those wonderful, deep forests of Africa. In my own experience I recollect that years ago as a young engineer, being in the State of Maine on a survey, where we were nine months away from civilization, in the staff tent we always read a chapter of the Bible every evening. I am sorry to say I don't believe I have read the Bible in that way since I got out of the woods and gave up the profession of civil engineering. I take it, that to the younger man just at the formative stage, when he gets out into the woods there is a something for him in the sound of the wind through the pines, there is a something in the sound of the little brook gurgling down among the stones, there is a something in the sound of the waves beating up against the shores, when he is just going to sleep at night — there is a fine message in those melodies ; we cannot perhaps read it, we cannot exactly put our fingers on the words, but the message is there; and you gentlemen who have been accustomed to life in the woods realize what I mean. It deepens a man's nature, it brings out the best that is in him to get away from the rattle and roar of the street cars and from this absolutely nauseating effort to grab money all the time, with no view to anything higher or better that unfortunately goes on so much in the city. To get out into the woods and on the water I believe makes a man a better man. Then, for heaven's sake, if you believe there is anything in it, encourage and foster any attraction that will get the city folk out where you gentlemen know the air is fresh, and the skies are blue, and where we can really live and talk with nature alone.

Discussion.

* The President—Have any of you any remarks to make in reference to this address ?

Mr. Niven—Mr. Chairman and gentlemen, I have been very much interested in the address we have just listened to. I think it will have a good effect. What he has said is perfectly true, as many of us know. Now, I have lived in the back country a considerable part of my life, about Haliburton. I know the tourist trade even up there amounts to quite a good deal to the people who live there. Guides go into the woods with these tourists, and I know that quite a number of Americans come up there. The business of guide has become quite an occupation in this country, and it is so in other parts of the back country that I have been in. I remember on a trip to the Hudson's Bay, when I ran the boundary line, when we were away back there we found tourists even in that country, and one thing showed me very forcibly the value of a moose. When we were entirely out of food, or almost so, our men hadn't come in with our provisions, a moose walked into our camp one Sunday morning, the cook picked up his rifle and shot him, and that moose kept us from starvation. I think it is a very important thing, and I am sure that what Mr. Evans has said will be very much appreciated by those who have heard him. As he says, there is no class of people who are more interested in what he has been talking about than the Land Surveyors of Ontario. I have much pleasure in moving a vote of thanks to the gentleman for the very fine address he has given us.

Mr. Kirkpatrick—Mr. Chairman, I have much pleasure in seconding Mr. Niven's motion. I have not had the opportunity of hearing Mr. Kelly Evans before, and I can see he is enthused with his subject, and it is a subject that there is not the slightest doubt every surveyor ought to have at heart, and I am sure that his remarks will bear fruit in the future.

Mr. Aylesworth—When Mr. Evans spoke about the surveyors holding prayers in camp it was a sort of surprise to me, although I had heard of such practices before. I remember one old surveyor out in the West who made a practice of holding prayers in his camp every morning, and I had heard of this many times, and heard the men speaking of it. One evening I went down to this surveyor's residence in Fort Rouge, near Winnipeg, and after I had got through with my business I looked around at his residence, and I said, "Mr. So-and-So, you have a very nice residence here." "Yes," he said, "about 25 years ago I surveyed these lots, and the parties for whom I had surveyed them were not in very good financial condition, and they asked me to take a few of the lots in part payment, and I did, and I allowed these lots to remain here until this portion of the city grew up, and then I thought I would prepare a habitation for my family. But," he says, "young man, that is not the only consideration that a man should have in this world, he should not only be preparing a habitation for his family and himself in this world, but he should also be preparing for himself a habitation in the world to come. Now," he said, "Mr. Aylesworth," — all in one breath without any hesitation whatever — "do you ever take anything?" (Laughter). I said, "I do when I can get it."

Speaking about the conservation of the natural resources brought to my mind another kind of extravagance that is practised out in the west, and that is regarding farm land where there is not the slightest attempt made at fertilization, where the straw taken from the land is burned in order to make room for ploughing, and, along that line, I met a representative farmer, a member of the Manitoba Legislature, and I was asking him about this. "Well," he said, "I don't believe in fertilizing the land for the benefit of posterity." He said, "My children are getting the benefit of that now ; they are getting their education there, too, and they are benefitting by using the land every year and not summer-fallowing, and I don't see, for my part, the slightest benefit to be derived from fertilization." That was a representative farmer, a man of very fair intelligence, and I venture to say, if my old friend Mr Niven will excuse me, it was one of those canny Scotchmen that used that phrase. So that you see there is considerable room for education along these different lines.

Then there was another point brought up about the fisheries in older Ontario. The speaker mentioned the Trent and Moira waters. There are a great many dams along those rivers that prevent the fish from the lakes coming up to the head waters and cohabiting with one another, and the fish are becoming depleted, and they are not allowed to increase and multiply, and the size of the fish is becoming smaller. The law at present is very complicated about interfering with private property, and it seems to me that something ought to be done in this direction.

I was very much interested in the remarks about how surveyors were interested. The speaker said that very few surveyors were rich. I believe that is true. Down at the Dominion Land Surveyors' Association banquet the other night the Dean of the profession got up and said that so far as his experience and observation went, there was not a single surveyor that died with a competency after educating his family in a respectable way ; when he passed out he left very little behind, and I guess in that way a surveyor would hardly know what to do with wealth if he did get it. There were two Irish women in New York City, and one of them said to the other, "Biddy, suppose a fortune was to be left to you what would you do with it ?" "Well," she says, "Be jabers, if a great fortune was to be left to me I would go down to the Waldorf Astoria and register, and when I registered I would have my name put down for a call at five o'clock in the morning." The other said, "Well, for the dear love of Heaven, what would you be doing that for?" The other says, "It's like this. When the bell boy came up and rang my bell for me to get up, I would yell back at him, 'Not on your tin-type, Kid, I don't have to now.'" (Laughter).

The President put the motion, which, on a vote having been taken, was declared carried, with applause.

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ROAD SUPERVISION.

W. A. MCLEAN, PROVINCIAL ENGINEER OF HIGHWAYS.

"Supervision" is the foundation stone on which road-building reform in Ontario must be placed. Lack of management has been the cause of an enormous amount of waste in road expenditure. The outlay on township roads in Ontario, in statute labor and money, exceeds two millions annually. This is steadily increasing. Statute labor in pioneer days was the right thing in the right place. To-day it is more than undoing the good done in former years. Not only is statute labor of to-day inefficient in itself, but cash expenditure is largely made in conjunction with statute labor, by pathmasters, on the statute labor basis, so that it places a two-fold handicap on road improvement. If this large outlay were handled in such a way as to give good roads, the misfortune would not be so great; but with statute labor squandered, and a considerable cash expenditure in its train, we still have the evil of bad roads. County road systems with Provincial aid are undeniably beneficial, but while increased outlay is needed the greatest good can come from such an awakening on the part of the ratepayers as will lead to the skilful direction of all expenditure now being made in the rural districts.

The remedy is not simply the abolition of statute labor, that is a minor part. The important feature is the system adopted in place of statute labor. Not only must that system be thoroughly efficient and practical, but it must be carried out with energy and good judgment. No system, however thorough, can be of use if left to itself—it will not be automatic. What is required is an active working out of an efficient system by the men upon whom its administration falls, backed up by a clean-cut and healthy public opinion.

Road-building, as with any other constructive work, has two parts — the theoretical and the practical. The one pertains to the engineer, the other to the contractor or foreman. The one includes the knowledge of what the completed road should be as regards materials, form, drainage, and the application of scientific principles to the design of a road; the other involves the direction of labor so as to produce maximum results at minimum cost.

How do pathmasters trying to build roads with statute labor serve these conditions? Without over-estimating the scientific ability necessary to build roads, it is safe to say that in no township can one or two hundred men be found who, as pathmasters, can qualify as road engineers; while to expect them as foremen to efficiently manage statute labor as well, is a travesty on the art of roadmaking.

No two pathmasters can agree as to what a road should be as to width, crown, grade, drainage, quality of material, —yet it is only by the skilful treatment of such details that a good road can be cheaply and durably designed. A defect in one particular may readily mean the undoing of the entire work. In teaming material, which is one of the great factors of cost, the size and number of loads per day often does not amount to one-third or one-quarter what a contractor or good foreman would exact. This means in effect that, for a given quantity of material, the cost of teaming is three or four times what it should have been. In many townships a rate of $3 or $4 per day for man and team is nominally paid, yet it really amounts to $12 or $16 for a full day's work. This is the rigid economy being practiced on the township roads of Ontario — as their condition fully testifies.

The organization which should exist is very simple — that of a joint stock company. The ratepayers are the stockholders; the council, the board of directors; and there should be one permanent manager (or road superintendent) carrying out the wishes of the directors. This centralizes responsibility, while the growing experience of the superintendent will be of increasing value. So long as municipal councillors rotate in office from year to year, their services in actual supervision of roadwork can be only a series of experiments in which they gain their experience at the expense of the people. If there is need for a permanent clerk or treasurer, much more is there need for a permanent road superintendent.

Cities and large towns, as a rule have such a system in the employment of a city engineer who can supervise, through foremen and inspectors, all work of either day labor or contract. County councils, in carrying on systems of county roads under the Highway Improvement Act, are required to have a road superintendent or engineer ; while their steel truss bridges must be constructed under a qualified engineer who can see that the plans and specifications are properly carried out.

The duties of a road superintendent will vary in detail according to local circumstances, and the municipality in which he is engaged, whether township or county. In general, he should attend all regular meetings of the Council to receive instructions from the Council, or give information regarding work proposed or in progress. He should report to the Council in the spring as to work he considers advisable, which report the Council may adopt or amend. He should report at the end of the year showing a full statement of work carried out and the cost. It will be his duty to purchase all ordinary supplies ; and make such recommendations to the Council as may be desirable regarding machinery or other equipment needed.

All men, teams, foremen and inspectors should be employed or discharged by him, and should be subject to his direction only. A councillor should never give instructions as to work except through the road superintendent. A contractor never gives directions to laborers except through a foreman or superintendent, and the same principle should be rigidly followed in municipal road work. To do otherwise destroys the superintendent's prestige with the men, undermines his power to preserve discipline and to secure the best work. Every man should feel that he owes his employment to the superintendent only, and that no "pull" can save him if the superintendent wishes to dismiss him.

The superintendent should keep an accurate record of men employed and the work done, furnishing to the Council at regular intervals, accounts and pay-sheets. The methods of payment and the keeping of accounts should be complete and above suspicion, requiring the certificates of foremen, the superintendent, and chairman of the road committee, and should have the approval of the Council. Wherever possible the certificate of two men should be on every account and pay-sheet presented to the treasurer.

Sufficient of the duties of the road superintendent have been suggested to show the object of having a road superintendent — to make it one man's business in every municipality to have direct charge of road-work. If he is thoroughly practical and a man of business, he can prepare plans and organize the work so as to get the greatest results for every dollar expended. The council and people will hold him responsible for so doing. He will study the best methods of road construction, of operating machinery, and of organizing the work. He should have, what few men possess, the ability to manage men so as to get full results from them. In the last analysis, upon the ability and energy of the man in charge, will depend the success or failure of the municipal road expenditure. Road improvement is a work not of one year, but of many years, it should be planned as such, and the first necessity is a man who will give it continuous attention for a term of years.

On works which he does not personally oversee, the superintendent should place a foreman. The foreman will receive his instructions as to how the work is to be done from the superintendent, and the foreman's essential qualification will be his ability to organize and control the labor to the best possible advantage. A first-class foreman is the most valuable part of any contractor's equipment. For a thoroughly efficient foreman, a contractor will pay the highest market price, for he knows that the cost of the work may easily be one-half under one foreman of what it is under another. As with the superintendent or engineer, these foremen should be retained as permanently as possible, so that their growing experience will make their services of increasing value to the county.

So long as work is carried on in short patches, the need for expert supervision is not felt throughout the country. To build roads profitably, they must be constructed in long sections, involving a very different degree of experience. A reeve recently pointed out to me, with pride, "the first continuous mile of road to be built in the township." This is not an isolated case. Many townships in the Province have yet to build their first continuous mile of road.

What part the engineers of the country will take in the road work of the future must remain for the profession to determine. That every municipality would be benefited by having an engineer as road superintendent is undoubtedly the case. They have the knowledge as to how a road should be built and can procure foremen to carry out their directions and manage the labor. I would urge that engineers take a more active part in the movement for better roads, and that they go more frequently before the public with practical advice in this matter. Engineers have been too apt to stand aloof, take no part in the good roads agitation, and when a superintendent is sought, may wonder why they have been overlooked, and a layman chosen instead. Had they "cast their bread upon the waters," would it not have been more apt to return to them ? My own view of the case is that there is too great a tendency for engineers to "hide their light under a bushel." When an up-to-date merchant has goods to sell, he displays them to the best advantage. If the engineers "have the goods," they should show them. Engineers will be employed in this work in county and township just as soon as the public are convinced that their services will be profitable. But the people of Ontario are not yet accustomed to the services of engineers in road work.

That the supervision of road work on each system, — township, county, city or province — should be centralized is a principle that has been found valid wherever the best roads are being built. In France, Germany, England, and the American States advanced in road building, the centralizing of responsibility is recognized as a vital necessity. In this way expert knowledge is directed to the design of roads; and the forces available are directed by businesslike methods adapted to any form of construction. The country roads, looked at as a purely local quantity, do not impress with their importance ; but as a part of the great transportation system spreading as a vast network throughout the Province, the aggregate forms a work of magnitude, and the results of neglect will seriously retard the material development of the country.

DISCUSSION.

Mr. Barrow—Mr. Chairman, it seems to me that where the Europeans are ahead of us is in the maintenance and repair of roads. I fancy that we can construct roads just as well here as there, but they seem to have a plan of keeping them in order better than we have.

The President—I think the mistake in our part of the country is that they never constructed them.

Mr. Barrow—I have seen some of the roads that have been done under engineers in Ontario, and they seemed to me to be equal in construction and quality to any, but they never maintained them well.

The President—No doubt those that have been constructed under the supervision of the engineer are all right. I mean the general construction of our country roads under the path-masters.

Mr. Wilkie—Mr. Chairman, I have much pleasure in moving that Mr. McLean's paper be received by the Association. I think we are entitled to accord the usual privilege to Mr. McLean for that paper, and give him a vote of thanks. The paper has been of much interest. I was much interested in it as he went along. The County from which I come is perhaps not so far advanced in the matter of road building as some of the others in possibly the older portions of the Province. My county seems to have, perhaps, I might say, a spite against the engineers. They employ a farmer as their foreman, and he has full control and does everything. However, the roads which he has built so far have given very good service. As Mr. Barrow suggested, I noticed that there was rather a lack of maintenance since the roads have been built. I presume within a short time we will likely fall in line with the others, and engineers will be employed to do at least the more difficult portions of the construction and look after them. I would move that the paper be accepted, and that Mr. McLean be given a vote of thanks by the Association.

Mr. Smith—Mr. President, I have listened to this address with a great deal of pleasure and profit to myself, and I think it is a profitable paper to the whole Association. The question of road construction, together with the question of municipal drainage, are two very important questions that this Association have to deal with. I have very much pleasure in seconding the motion. The motion was carried with applause.

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ARE OUR DRAINAGE LAWS AS WORKABLE AS THEY SHOULD BE ?

BY G. SMITH, O.L.S., LINDSAY.

The object of this paper is to bring before this Association some practical experiences, which the writer had, during the past twenty-five years, in dealing with both the Municipal Drainage Act and the Ditches and Watercourses Act, and if a discussion thereon may result in some suggested improvements in these laws, valuable assistance will be thereby given to those who, like Mr. C. C. James, are making such efforts to increase the agricultural output of this Province, and which undoubtedly can, as he states, be increased threefold.

The Agricultural Department has been giving, for some time past, valuable instructions in drainage to the farmers of the various agricultural communities ; but this is limited owing to the fact that, in many cases, the farmer who wishes to avail himself of these instructions finds his drainage outlet stopped by a neighbor who does not wish to drain, and the only way to get this outlet is to put into operation the provisions of the Ditches and Watercourses Act, and this farmer, having learned from the experience of some neighbor, that this means of obtaining an outlet will, very probably, involve an outlay of $200.00 to $300.00 in law costs before the coveted outlet, which would cost perhaps not more than $60.00 to $80.00, can be obtained, and so the matter is dropped and no drainage done.

The Ditches and Watercourses Act is, up to a certain point, an excellent piece of legislation, but on this certain point it is so faulty in practice that its usefulness is thereby paralyzed. The difficulty might be expressed in the word "opinion," and this word, although not used so plainly in the Act in question as in the Municipal Drainage Act, is, nevertheless, implied in the engineer's oath of office, wherein he is obliged to make his award "according to the best of his knowledge, judgment, skill and ability," i.e., opinion, and as he does not care to have this award amended or set aside by the County Judge to whom it may be appealed, he, naturally enough, allows his opinion to be influenced by what he knows, perhaps from experience, to be the opinion of the judge, who, although doubtless well learned in the law has, generally, very hazy ideas on drainage matters, and the writer has, more than once, been called upon to enforce an award, so amended, that was quite beyond engineering intelligence, and so the only drainage that ever resulted was the drainage of the farmers' pockets in unnecessary law and engineering fees.

Suppose we now look at that clause in the Municipal Drainage Act in which the engineer is required to state in his "opinion" the proportionate benefit to be derived from the proposed drainage, by every lot or parcel, etc., etc., and on this point the writer has no hesitation in stating, from an experience of fifteen years as a farmer, and twenty years as an engineer, that this "opinion" of the ordinary engineer, like that of the ordinary County Judge, no matter how conscientiously formed, is not as reliable as that of scores of intelligent farmers with whom he is acquainted, although at the same time, the engineer may be master of his job in so far as the location and grade lines, etc., of his drain are concerned, and the Judge may be equally skilful in giving a decision from the evidence before him ; but this is a question of opinion formed from observation and not of evidence.

Our legislators made an attempt, a few years ago, to improve matters by empowering Township Councils to appoint two ratepayers to "assist" the engineer in the discharge of his duties, but this did not appear to work, for, as far as the writer can learn, local prejudices rather interfered.

The writer feels reluctant to proceed farther with his criticisms although many others could be made, but turns with relief to the suggestion of a means of remedying these defects in the laws quoted, by introducing the principle, which, briefly outlined, is as follows :—

The County Council to appoint a number of Drainage Commissioners not exceeding, say, a dozen, who will have jurisdiction anywhere in the county, wherein appointed, and let the office of Township Engineer be abolished.

When at the friendly meeting held under the D. and W. Act the parties failed to agree, the promoter of the proceedings may select his Commissioner to enforce these proceedings and call upon those opposed to the work to do the same, to support their views, and, failing to do so within ten days, the County Judge be authorized to make the appointment, when these two, so appointed, shall appoint any Ontario Land Surveyor in actual practice as their engineer and referee, whose duty it will be to furnish the necessary plans, profiles, estimates of cost, etc., etc., from which data the Board, so constituted, shall make their award between the interested parties, and in the event of any failure to do the work in the time awarded, the Board to appoint one of its members to carry out the award in the usual manner.

In the event of the two Commissioners failing to agree upon an engineer, the County Judge be asked to make the appointment.

An appeal against this award to be, as now, to the County Judge, but on points of law only.

The same principle might be adopted in the construction of drains under the Municipal Drainage Act, and an application be made to the Council to raise the necessary funds therefor, in the same manner as a Board of School Trustees would adopt in financing a new school.

If some such amendments could be made as herein outlined the farmers would, the writer feels assured, drain the many wet areas that even the most ordinary observer can see in all directions in Ontario, as they would then feel that they were handling their own business, and that the law was made for them and not they for the law.

In conclusion Mr. Smith said: I may be a little severe, but I do not think I am too severe. Municipal councils are here to-day and away to-morrow. The drain is started and it never ends. If we could get these Commissioners together I think we could remedy that.

DISCUSSION.

Mr. Jones—Your idea is to have Commissioners permanently appointed ?

Mr. Smith—Permanently appointed.

Mr. Jones—And let them decide upon the location of the drain and the amount to be done by each, from the information and levels furnished by the engineer.

Mr. Smith—He lays out the drain and furnishes them with the information, plans, profiles, etc., and those three discuss the levying of the cost of construction and all matters such as that, but not as to the proportion of benefit to be derived by each party, and in that way try to take that feature of it out of the hands of the County Judge altogether. The same principle is at work in either the Ditches and Watercourses Act or the Municipal Drainage Act.

Mr. Jones—It would be something like that clause that they added to the Municipal Drainage Act, by which the Commissioners assisted the Engineer in levying the assessment.

Mr. Smith—That was the idea they had, that two ratepayers could go with the engineer to assist him, but that gave rise to difficulty in the Township. Certain little prejudices were brought to bear on it and it didn't work well, but it shows the feeling that there is a necessity for something in the way of a Commission. If these men had been appointed by the county and brought into the township from the adjoining township there would have been none of that local feature about the work at all.

Mr. Jones—It would be best to have someone from another township to look after the work.

Mr. Smith—Yes. Let the Board pick their engineer where they liked, as long as he was a man in actual practice. That was my idea. I didn't put all this in the paper.

The President—That is the principle they act on in the Western States. They have a Board of Commissioners on Drainage.

Mr. Smith—It seems to me that a Board of Drainage Commissioners, if a drain was once started, would do one thing or the other, drop it or bring it to a finish, and that is not often done.

The President—Sometimes they drop it altogether, and there is a waste of time and money. I think there is lots of room for discussion on that paper, and it is now 12.15 p.m.

Mr. Smith—That was my idea in reading the paper, that it would bring out a little discussion.

The President—How would it do to bring up this discussion later on when we have a little time to spare ?

Mr. Chase—I think the important point is to endeavor to have the audit and taxation of the engineer's account done by the Drainage Referee instead of the County Judge. I think if these things could be brought up and discussed it would be a good thing.

Mr. Smith—I might make the remark that the Drainage Referee is more in touch with the engineers and their difficulties and the nature of the work they have to do, and he is a far better authority on the pay of an engineer than the County Judge is.

The President—Far more. The County Judge wants to get over the thing as easily as possible.

Mr. Chase—When it was brought up by Messrs. Code & Moore at Smith's Falls I had a piece of work for Mr. Moore and when his account was audited by the County Judge it was cut down some $986. He appealed it, but the appeal was not allowed, because the judges held they had no right to strike out the audit of the County Judge. They wanted it taken out of the hands of the County Judge and put in the hands of the Drainage Referee. He said they lost that whole amount.

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REINFORCED CONCRETE SEWER PIPE.

OWEN McKAY, C.E., WALKERVILLE, ONT.

Having been employed by the Council of the Town of Sandwich, in A.D. 1909, to prepare plans and specifications for a sewer on Bedford street, and also a main outlet sewer from Bedford street on Park street, across the marsh to the channel bank of the River Detroit, which should have sufficient capacity to afford an outlet for a sewer system, comprising about 200 acres in the southerly portion of the town, and as a large portion of this outlet sewer was laid through a marsh, I thought a few remarks on the subject might prove of interest to some of the members of this Association.

About 540 feet of this main outlet west of Bedford street was laid on dry land, 1,400 feet in a marsh, and 200 feet in water, including the timber box culvert.

The marsh soil consisted of from one to three feet of peat or bog soil, overlying clay subsoil, and covered with water to the depth of from 8 inches to 24 inches at the ordinary summer level.

I recommended a two-ring brick sewer, 48 inches internal diameter, from Bedford street to the edge of marsh, and as brick would be unsuitable for sewer construction in the marsh itself, owing to the fact that it would be submerged at greater or less depths, I decided on recommending a Jackson reinforced concrete pipe sewer 48 inches internal diameter, as manufactured by the Jackson Concrete Pipe Co., Jackson, Mich., U.S., for the following reasons :

The sewer pipe is strongly reinforced by No. 9 wire, also heavy longitudinal and transverse iron bands. These longitudinal bands, which cause the pipes where laid to interlock one with the other, and thus make a perfect bond after the joints are cemented.

(2) The pipes were manufactured on the ground as close to the work as circumstances would permit, by setting up the steel forms of the proper radius, oiling them well to prevent the concrete from adhering to the steel, and pouring the concrete into the form, and carefully tamping the same, thus insuring the work to be done under proper inspection.

After the concrete has been allowed to set, the forms were removed and the process repeated until the pipes were all made.

After the work was completed in the marsh, the pipes were laid in the water, out 125 feet from the beach in a similar manner, excepting that a line of sheath piling was driven on each side to prevent the wash from passing boats from undermining the pipes.

By using this method we got an almost perfect sewer, the pipes being all interlocked and the socket joints filled with cement mortar 1 to 2, and brushed on the inside with neat cement.

The concrete pipes being moulded in steel moulds had a very smooth surface, and will make a perfect sewer carrier.

The concrete in the sewer pipe was mixed in the proportion of one part Portland cement to five parts of clean, coarse lake gravel.

I believe that concrete will soon supersede all form of material for sewer construction for the larger size of sewers, say from two feet in diameter upwards. It would, however, be an improvement if manufacturers would make egg-shaped concrete pipes as well as circular shapes for the large sizes.

I am also of the opinion that better results will be obtained by making the pipes in moulds on the surface instead of laying them in the trenches after they have been properly cured and cementing the joints, owing to the fact that the interior surface will be smoother and of more uniform shape and size than if the sewer were constructed by laying concrete in the trench.

The material and workmanship would also be subject to closer and more effective inspection. The cost of brick sewer 40 inches internal diameter, $4.50 per foot. Cost of 48-inch concrete pipe sewer in plan, $4.60 per foot, including excavation, concrete base, etc. Cost of timber box outlet, $10.00 per foot.

[*This Association is not responsible, as a body, for the opinions expressed in its Papers by Authors.*]

A FEW GENERAL OBSERVATIONS.

BY JAMES DICKSON, O.L.S., FENELON FALLS.

The principal objects had in view at the annual meetings of this Association are primarily for an exchange of experiences, and to discuss any difficult problems which any member of the profession may have met with in his practice, either with regard to evidence as to original lines or monuments where he found such clashing with each other in such a manner as to leave great doubts in the mind of any man which would be the proper course to pursue in order to meet the letter and spirit of the law, and also do justice to the owners of the lands in dispute, or any other difficulty which will occasionally crop up, and to get an expression of opinion from the members as to which course would be the correct one to pursue.

Every surveyor whose practice lies in those townships which were surveyed prior to from one-half to three-fourths of a century ago, when the magnetic needle alone was used to determine the course of a line, and not a tree was cut on either hill or dale in order to admit of a backsight being available; when the whiskey barrel held equal rank with that of flour and pork in the larder of the camp, and when all the traverse that was made of either a lake or river was very little if anything better than a rough sketch between points cut by township lines, will bear me out in the assertion that cases are constantly being met with that task both the patience and skill of the ablest members of the profession. I have a case now on hand where I expect one of our superior courts will have to determine who is the owner of a point on a lake shore, whether it is a part of one or other, or a part of neither of two broken lots. The township was surveyed in 1824, and in the year following, 1825, the two lots in front of which the point lies, and which is the most prominent figure on the whole lake, was patented in one deed to the man who surveyed the township. The lands are described by mete and bounds, written presumably by the surveyor himself, yet in neither the field notes or plan of the township, or in the deed of conveyance is there either a word or line to show that such a point ever existed.

But while such are the primary objects of the meetings, I submit that it would add both life and interest to both the meetings and reports if some of the members of the profession, and there are quite a number well qualified to do so, who have had experience in our northern wilds, would present a paper occasionally descriptive of the section they have been in, its flora, the habits and habitat of the fauna, its streams, lakes, etc., with a stirring adventure, if there has been any such, thrown in.

Of course there are the official reports to the departments, but those require to be written along certain lines. The writer might recount numerous incidents which would add interesting variety at our meetings and annual reports which could have no place in a departmental report.

We have occasionally a newspaper reporter giving a graphic description of "canoeing in the north," or a student out for his holidays with a survey party, or the experiences of the ubiquitous fire ranger, but we find that on the average they are either subject to strange hallucinations or susceptible of being most beautifully "stuffed." All very good fellows no doubt in their own proper sphere of life, but the veriest noodle from the bush could give them valuable pointers for the woods.

Permit me to mention one or two instances. A young city student out with a survey party on the Upper Ottawa, in a highly colored account of his adventures to a leading newspaper, tells how on one occasion they covered some sacks of long clear bacon with balsam brush to protect it from the bears. Another, in an illustrated article shows a man carrying a canoe across a portage, his head concealed in one end, the other trailing on the ground. Only the other day I chanced upon an article in a magazine written only a few months ago, in which the writer professed to describe a part of the Abitibi country. He starts out by placing the watershed fully fifty miles too far north, then gravely asserts that the Hudson Bay Company in exporting their furs from the lower Abitibi ascended Frederickhouse River to its source, packed across from there into the Montreal River, and down that stream to Lake Temiscaming. Now I venture to say that there never was a beaver skin taken on the Abitibi that reached the market by that route, not to mention the difficulties on the Montreal River between Bay Lake and its mouth, and also the tedious portages between Night Hawk Lake and the navigable water on the Montreal. With the one exception of the Long Sault, there is less heavy work between the mouth of Frederickhouse River and the Ottawa by way of Abitibi Lake than there is in one stretch of ten or twelve miles on the Frederickhouse.

I do not know if my suggestions along this line will command the sympathy of my fellow-surveyors or not, but I have long felt that if the beauties and attractions of our northern wilds were written up in a popular manner it would not only contribute a lot of wholesome reading, but lay before the public the attractions and resources of a large section of country which requires only to be seen to be appreciated, and I cannot think of any persons so well qualified to do it justice as members of my own profession, the Ontario Land Surveyor

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NEW BRUNSWICK SURVEYS.

W. E. McMULLEN, O.L.S., FREDERICKTON, N.B.

Knowing as I do the status of our work, both in Ontario and New Brunswick, I do not presume to write this paper with the idea of explaining to you advanced survey methods, but rather with the hope you may be interested and indirectly benefitted by hearing of work relating to our profession outside your own province.

I would say at the outset that the embryo surveyor in New Brunswick has certain advantages over his brother in Ontario, advantages which are questionable after he is full fledged. For example, he need not lie awake at night worrying about either Survey, Municipal or Drainage Acts. There are none so far as he is concerned. Neither does he plug for his preliminary nor serve thereafter one or three years as the case may be. A merciful Government many years ago spared him all these things, and arranged for him to learn surveying in three months and qualify at the end of this period in one examination. It is almost unnecessary to say that laxity in the requirements is detrimental to the standard of the profession. Of course there is another side to the story. Many ot the settlers in the Province and others who had to bear the brunt of survey bills were far from being well-to-do ; land was plentiful and much of it poor, so that from an economic standpoint, the expensively trained and higher priced surveyor was not encouraged. On account of modern facilities for technical education, candidates now presenting themselves for examination are often quite well fitted in that respect, but after a number of years' experience in both Provinces, I am convinced that there is no better training for a man who is going to make surveying his profession than a moderately long apprenticeship.

Until Acadia, as New Brunswick was then called, was ceded to the English in 1763, and in fact until the advent of the Loyalists some twenty years later, there was little necessity for surveys other than those for mapping the coastline and rivers. I might say here that quite a good map of this kind was produced by Franquelin as early as 1686. About 1765, the English began to occupy this part of the Province of Nova Scotia, for it was not until the year 1786 that New Brunswick was partitioned off and made into a Province. One of the present Premier's forefathers, who was a Hazen, had a trading post at the mouth of the St. John River a number of years before the Revolution. There was also an ante bellum settlement at Maugerville, below Fredericton, on the St. John River, and some English settlers also on lands in the southeastern part of the Province, which had been cultivated for some years by their French predecessors. But settlements and land surveying did not amount to much until after the influx of Loyalists and disbanded regiments occasioned by the close of the Revolutionary War. A few days ago I uncovered an old plan in the office, called the Township of Sunbury, and which showed the River St. John, evidently from survey, on the site of what is now Fredericton. It was then called St. Anne's. The plan is somewhat interesting, as it bears the date 1768, and was prepared in the City of New York. On it were the signatures of some four or five men, to whom tracts of land shown on the plan were evidently being granted. There is no evidence, however, that the actual survey included anything more than a traverse of the river; the rest appears to me to be simply a projection. After the war, our counties were always divided into Parishes, as being English and loyal, rather than Townships, which were American, and consequently unsuited to a Loyalist Province. In order to provide for thousands of Loyalists who at this time flocked to the Province, and for the purpose of rewarding soldiers who had fought for the King in the war, large tracts of land were laid out principally along the River St. John. These tracts usually consisted of 200 acre lots or thereabouts, one tier deep, fronting on the river. I think in most cases these lots were posted on the river front and the outline of the whole tract run. Sometimes, though, the survey did not leave the river front, and future generations were left to finish the survey.

After the war of 1812, grants were again made to discharged soldiers, the size of the grants varying with the rank of the soldier. Between these periods and since then individual lots were continually being applied for for settlement purposes. Unfortunately in many of these cases lots were granted wherever the applicant wished to take them out of the Crown Land, with the result that throughout the Province there are to-day numbers of vacant lots once covered by heavy timber which have been cut over, burnt up and abandoned, being unsuited for agriculture. These lots were generally surveyed singly as applied for, and without forming any part of a general scheme, as is practised in the newer provinces. Some small tracts for settlement purposes were also laid out, and while these were laid out systematically within themselves, they bore no relation to any regular sub-division of the Province. Usually the suitability of the land for settlement purposes, or the fact of its being adjacent to a river of settlement road, determined the position of the tract. As a large portion of the Province is still timber land, and yet in the hands of the Crown, there was an opportunity in recent years to lay this out systematically. This was taken advantage of by projecting block lines, generally 200 chains apart, and running astronomically north and south, east and west. These lines were run out as required, but, like almost all the surveying in the Province done with the compass, approximate allowance being made for the magnetic variations. One of the great problems which the department which I am connected with, and which I am sure all similar departments in other Provinces also have to face, is the protection of the timber lands, and at the same time giving proper encouragement to the settler. Having by past experience seen the futility of allowing prospective settlers to locate anywhere they saw fit on vacant land, the present administration has provided that no land shall be "approved" to any applicant until it has first been examined and found to contain more than 50 per cent. of agricultural land. Applications also are being confined to land in the vicinity of existing settlements or railroads. The whole idea being to prevent people settling on poor land, and to protect the spruce land, which is usually unfit for farming. There are but two ways of obtaining grants of land in this Province, by public sale and under what is called "The Labor Act." Formerly a good deal of land was sold, but now it is a principle of the Government not to sell its land, except it might be perhaps a small piece of two or three hundred acres or less which has become surrounded by granted land and which is therefore difficult to protect from timber poaching. Under "The Labor Act" any man of 18 years of age or over, who does not own other land in the Province, may be allotted 100 acres of Crown land. He is required to do $30 worth of statute labor, build a small house, live in it for three years, and cultivate at least 10 acres of land. At the end of this period he gets his grant.

The Crown timber land is leased until the year 1918. It is first put up at public auction with an upset price of $20 per square mile for a minimum of two square miles, and if there is no collusion among the bidders this may run up to $200 a mile for good land. Thereafter $8 per mile rental and stumpage at $1.25 per thousand is charged. When division lines between licenses are to be run, an order for the survey with instructions as to method of survey is issued by the Crown Land Department, but the applicants pay all charges. As I intimated in opening this paper, there is no "Act" defining methods of surveys or re-surveys ; in the former the surveyor must obey his instructions from the Department, and in the latter he must obey the universal unwritten law to endeavor to establish the lines as they were originally run, and when it is impossible to be sure of this, he still has the law of common sense to fall back upon. New surveys for individual farm lots being taken up are now so closely connected with former grants that the returns require very careful supervision to prevent the interference with land already granted. The system of keeping track of the grants, which has been in use for I suppose nearly a hundred years, may be of interest. The settlement portions of the Province are laid down on paper maps drawn on a scale of 50 chains to the inch. These maps are about 24 inches by 30 inches, and are mounted on heavy board and bound into books, about a dozen maps to the book. When a lot is applied for, the name of the applicant is entered in pencil on the approximate site, and his application filed in the case for the county under the applicant's name. After the land has been examined an order of survey is issued, the applicant paying for the survey. In due time the survey is returned, examined, and if all right, entered upon the map in ink, but the applicant's name left in pencil. The lot is then "approved" by publication in "The Royal Gazette," is partly improved, and the applicant does his road work. His name is then entered in the "Doomsday Book," so called, and he is given a record number. This number and his name are now entered in ink upon the map. After the completion of the residence and other requirements the grant issues, and the lot is marked "X," the return of survey is gummed into a large book for the particular county, and the book number and page entered thus (7—142) on the map. A copy of the plan which accompanies the grant is also entered in another book, and similarly recorded after the "X." All papers leading up to the grant are put together, given their consecutive number for the year and filed. This number is entered in the grant book on the page containing the grant plan, so that by reference to the map and then to the grant book papers for any grant issued in the past hundred years may be almost instantly turned up.

Another branch of surveying with which the Department has to do is mining. Surveys are required for licenses to work and for twenty year leases ; these generally include an area of one square mile, and are bounded, rather unfortunately, I think, by lines running north and east magnetically. The almost universal use of the compass accounts for this, but sometimes on account of the annual variation has caused confusion. To my mind it would have been much better to have made these lines astronomic, even though it was necessary to allow for the variation and run them with the compass. The variation in this Province is from 20 degrees to 22 degrees west. For the past few years there has been no perceptible change in the variation. A hundred years ago the variation was about 15 or 16 degrees.

In concluding this more or less disjointed article, which is much longer than I had intended it should be, I would say that although many of the methods observed here are not quite the same as with you, yet they after all have best suited the exigencies of the times, and when we need more refined methods I have no doubt they will come. There is one characteristic, however, which is common to both Provinces, and I think even goes far beyond our respective Provinces, and that is the surveyor, (there are a number of him) who loves his calling because he is interested in his work, because it is one of the most honorable of professions, being essentially an honest one, and because it takes him out into Nature and into God's free air.

MEMBERS

1910

The names of those members granted exemption by By-laws ratified by the Association are marked *.

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Abrey, George Spencer, 270 Willowby Ave.	6th April, 1906
Allan, John Richard, Renfrew Grad. S.P.S.	6th Nov., 1894
Anderson, Frederick John, Niagara Falls,	1st May, 1910
Anderson, Herbert McEwen, Dundas,	18th April, 1910
Ardagh, Arthur Gowan, Barrie Grad. S.P.S.	18th Feb., 1908
Aylsworth, Charles Fraser, Jr., Madoc D.L.S.	8th Jan., 1886
Aylesworth, John Sidney, Sharp's Corners, Ont. D.L.S.	9th Jan., 1871
Baird, Alexander, Leamington C.E.	7th July, 1877
Baker, Mason Herman, St. Thomas D.L.S.	16th Feb., 1909
Barrow, Ernest George, Hamilton D.L.S., Mem. Can. Soc. C.E., City Engineer.	4th Oct., 1877
Bazett, Edward, Huntsville D.L.S.	8th July, 1881
Beatty, David, Parry Sound D.L.S.	12th July, 1869
Beatty, Herbert John, Eganville Grad. S.P.S.	8th Nov., 1893
Beatty, Walter, Delta D.L.S. M.P.P.	19th July, 1858
Bell, Andrew, Almonte B.A., Mem. Am. Soc. C.E., Mem. Can. Soc. C.E., Mem. Ont. A.A., D.L.S.C.E.	14th Oct., 1901
Bell, James Anthony, St. Thomas D.L.S., Co. Engineer, Elgin; City Engineer, St. Thomas.	11th Oct., 1875

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Bigger, Charles Albert, Ottawa, 145 Gloucester St. D.L.S., A.M. Can. Soc. C.E., B.C.S., Astronomer, Dept. Interior.	6th Jan., 1882
Bingham, Edwin Ralph, Fort William D.L.S.	17th Feb., 1906
Blake, Frank Lever, Toronto, Meteorological Office D.L.S.	13th April, 1875
Blair, William John, New Liskeard Grad. S.P.S.	13th Feb., 1904
Bolton, Ellsworth Doan, Listowel B.A.Sc. (McGill).	7th Nov., 1899
Booth, Charles Edward Stewart, Not known D.L.S.	6th April, 1882
Boswell, Elias John, C.P.R. Construction Dept. Offices, Winnipeg, 135 Carlton st. Grad. S.P.S., D.L.S.	7th Nov., 1896
Bowman, Clemens Dersteine, West Montrose	10th July, 1879
Bowman, Herbert Joseph, Berlin D.L.S., Grad. S.P.S., Treasurer County Waterloo, Assoc. Mem. Can. Soc. C. E.	7th Jan., 1887
Bowman, Edgar Peterson, West Montrose	17th April, 1907
Bray, Lennox Thompson, Amherstburg D.L.S.	17th Feb., 1902
Bray, Harry Freeman, Oakville D.L.S.	10th July, 1882
Bray, Samuel, Ottawa, Dept. of Indian Affairs D.L.S., C.E.	6th Jan., 1877
Brian, Michael Edward, Windsor City Hall B. A. Sc.	17th Feb., 1906
Brown, David Benjamin, Box 304, Manads, Brazil, South America D.L.S.	23rd Feb., 1904
Brown, George Laing, Morrisburg Grad. S.P.S.	19th Feb., 1898
*Brown, John Smith (address not known) D.L.S.	8th July, 1852
*Browne, Harry John, Toronto, 203 Albany Ave. C.E.	6th July, 1872

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Browne, William Albert, Toronto, 18 Toronto st.	10th April, 1876
Browne, Wm. Herbert, 18 Toronto St., Toronto.	18th April, 1910
Burd, James Henry, Sudbury. Grad. S.P.S.	2nd Oct., 1905
Burgess, Edward LeRoy, Ottawa, 21 First Ave.	6th May, 1905
Burt, Frederick Percy, New York, N.Y. President "The American Architect," Times Bldg., New York.	8th July, 1885
Burwash, Nathaniel Alfred, White Horse, Y.T. D.L.S., Grad. S.P.S.	6th May, 1905
Bush, Clayton Elgin, Toronto Grad. S.P.S.	15th May, 1908
Butler, Matthew Joseph, Deputy Minister of Railways and Canals, Ottawa C.E., M.I.C.E., Mem. Am. Soc. C.E., Mem. Can. Soc. C.E.	11th Jan., 1878
Byrne, Thos. Henry, Ottawa.	24th February, 1910
Caddy, John St. Vincent, Ottawa, 327 Laurier Ave D.L.S.	6th Oct., 1866
Cameron, Alfred John, Peterborough	9th April, 1889
Campbell, Alexander Stuart, 288 Queen St., Kingston.	24th February, 1910
Campbell, Archibald William, Ottawa, Deputy Minister of Railways & Canals C. E.	10th April, 1885
Carre, Henry, 276 Albert st., Belleville, Box 203 M.O. & Georgian Bay Canal, B.A. and C.E. (Trin. Coll., Dublin), D.L.S.	8th Nov., 1861
*Carroll, Cyrus, Prince Albert, Sask. Mem. Can. Soc. C.E., D.L.S. District Surveyor and Engineer.	10th Jan., 1860
Casgrain, Joseph Phillippe Baby, 180 St. James St., Montreal. D. L. S., P. L. S., (Que.) C. E., Assoc. Mem. Can. Soc. C. E. Chief Eng. M. & P. J. Ry., Senator.	5th Jan., 1887
Cavana, Allan George, Orillia D.L.S.	8th July, 1876
Chase, Albert Victor, 580 Church St., Toronto. Grad. S.P.S.	21st April, 1909
Chipman, Willis, Toronto, 103 Bay st. D.L.S., B.A.Sc. (McGill), Mem. Am. Soc. C.E., Mem. Can. Soc. C.E.	4th Oct., 1881

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Christie, Uriah Wesley, 815 Somerset St., Ottawa.	1st March, 1906
Clarke, Fred Fieldhouse, 22 Gibson Ave., Toronto, Ont. Grad. S.P.S.	31st March, 1905
Clarke, Leonard Oswald, North Bay	14th Feb., 1903
Code, Abraham Silas, Alvinston	14th April, 1896
Code, Samuel Barber, Smith's Falls	1st May, 1905
Code, Thomas George, Box 330, Cobalt	17th April, 1907
Code, Richard Stanley, Box 330, Cobalt	17th April, 1907
Cook, William Albert McMichael, Toronto	19th April, 1910
Cotton, Arthur Frederick, New Westminster, B.C.	11th July, 1874
Cozens, Joseph, Sault Ste. Marie D.L.S.	7th July, 1875
Crerar, Samuel Rutherford, Toronto, School of Science D.L.S., B.A.Sc., Toronto.	1st March, 1906
Dalton, John Joseph, Weston, Ont D.T.S.	11th Jan., 1878
*Davidson, Alexander, Arkona D.L.S.	11th Oct., 1858
Davis, William Mahlon, Berlin Grad. R.M. Coll. (Kingston), Town Engineer.	11th April, 1885
Deacon, Thomas Russ, Winnipeg Grad. S.P.S.	12th Nov., 1892
Deans, William James, Brandon, Man D.L.S.	11th July, 1884
DeMorest, Richard Watson, Sudbury M.E.	9th April, 1889
Dempster, Herbert Orville, Gananoque.	24th February, 1910
Dickson, James, Fenelon Falls D.L.S.	6th April, 1867
Dixon, Howard, Can. Nor. Ry., Winnipeg Grad. S.P.S.	14th Feb., 1903
Dobie, James Samuel, Thessalon B.A.Sc. (Toronto Univ.), D.L.S.	21st Feb., 1898

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Dunn, Thomas Hamilton, Winchester. Grad. S.P.S.	14th May, 1906
Eagleson, Francis Merwin (not known) Grad. S.P.S.	11th May, 1909
Esten, Henry Lionel, Toronto, 157 Bay st.	7th Jan., 1887
Evans, John Dunlop, Trenton D.L.S., Mem. Can. Soc. C.E., Chief Eng. Cent. Ont. Ry.	8th July, 1864
Fair, John, Brantford	13th April, 1875
Fairbairn, Richard Purdom, Toronto, 452 Markham st. Surveyor for Dept. of Pub. Works, Ontario.	7th Oct., 1876
Fairchild, Charles Court, Brantford Grad. S.P.S., D.L.S.	9th April, 1894
Fairchild, William Howard, Brantford	17th Feb., 1900
Farley, Sidney Edward, 362 Rideau St., Ottawa P.L.S., Que.	21st April, 1909
Farncomb, Alfred Ernest, Red Deer, Alberta D.L.S.	9th April, 1895
Farncomb, Frederick William, London, 213 Dundas st.	6th Nov., 1889
Fawcett, Thomas, 283 St. Clarens Ave., Toronto Dom. Topographical Surveyor.	6th Jan., 1881
Fitton, Charles Edward, Orillia, Box 142. D.L.S.	10th April, 1879
Fitzgerald, James William, Peterborough	13th Feb., 1904
Flater, Frederick William, Chatham	9th April, 1888
Francis, John James, Sarnia P.O., Box 304 D.L.S.	16th Oct., 1861
Fuce, Edward Oliver, Galt.	17th Feb., 1906
Fullerton, Charles Herbert, New Liskeard D.L.S., Grad. S.P.S.	7th May, 1906
Galbraith, William, Bracebridge D.L.S.	4th April, 1883
Gamble, Killaly, Toronto, 21 St. George Mansions D.L.S., P.L.S. (Man.), Sec. Assoc. O.L.S., Captain R.A. (Ret').	6th April, 1888
Gardiner, Edward, St. Catharines D.L.S.	6th Jan., 1866
Gaviller, Maurice, Collingwood, Box 164 C.E. (McGill), D.L.S.	6th Jan., 1866

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Gibson, Peter Silas, Willowdale C.E.M.S. (Mich. Univ.), D.L.S., Mem. Can. Soc. C.E.	19th July, 1858
Gibson, Wilbert Silas, Willowdale	21st Feb., 1898
Gillon, Douglas John, Fort Frances Grad. R.I.E. Coll.	9th Nov., 1895
Graydon, Aquila Ormsby, City Engineer London	8th July, 1880
Green, Thomas Daniel, Prescott, Ont D.L.S.	7th Jan., 1885
Greenlees, Alex'r Hunter, 866 Wellington St., N., London, Ont. Grad. S.P.S.	21st April, 1909
Griffin, Albert Dyke, B.A., Galt	11th Nov., 1890
Halford, Abraham Joseph Bartholomew. 25 Surrey Place, Toronto.	(not known)
Hanes, George Samuel, North Vancouver, B.C City Engineer. Grad. S.P.S.	6th May, 1905
Hart, Milner, Toronto, 51 Yonge St. D.L.S.	11th July, 1863
Henry, Frederick, London, Albion Bldg.	7th April, 1887
Holcroft, Herbert Spencer, 182 Bloor St., W. Toronto D.L.S., B.A.Sc. (Toronto Univ.).	17th Feb., 1902
Hopkins, Marshall Willard, Edmonton, Alta. D.L.S., B.A. Sc. (McGill), Assoc. Mem. Can. Soc. C.E.	13th Nov., 1893
Hutcheon, James, Guelph, 48 Glascow St. Grad. S.P.S.	10th Nov., 1891
Jackson, John Herbert, Niagara Falls	16th Feb., 1901
James, Darrell Denman, Toronto, 227 George st. D.L.S. B.A., B.A.Sc. (Toronto Univ.).	3rd Nov., 1891
James, Silas, 227 George St., Toronto. D.L.S.	19th July, 1858
Johnston, Herbert, Berlin Grad. S.P.S.	21st Feb., 1905
Johnston, Wm. James, St. Catharines.	10th May, 1910
Jones, Charles Albert, Petrolea D.L.S.	8th April, 1881

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Jones, George Samuel, Smith's Falls, Grad. S.P.S.	21st April, 1909
Jones, John Henry, Sarnia, Box 194 D.L.S.	10th Oct., 1886
Jones, Thomas Henry, Brantford B.A.Sc. (McGill), D.L.S., City Engineer.	10th Oct., 1878
*Keefer, Thomas Coltrin, Rockliffe Manor House, Ottawa D.L.S., C.E.	14th Aug., 1840
Kirkpatrick, George Brownly, Toronto, Dept. of Lands, Forests and Mines D.L.S., Director of Surveys.	13th April, 1863
Laird, James Stewart, Essex D.L.S.	6th April, 1867
Laird, Robert, Haileybury Grad. S.P.S.	11th Nov., 1887
Lang, John Leiper, Toronto, 20 Leopold St	2nd May, 1908
Lawe, Henry, Ottawa	6th Oct., 1860
Lee, Roger Melville, Hamilton	19th April, 1910
Le May, Tracy Deavin, Toronto	1st May, 1909
Lewis, John Bower, Ottawa, Brunswick House D.L.S., P.L.S. (Quebec), C.E.	4th Oct., 1883
Lougheed, Aaron, Port Arthur D.L.S.	12th Nov., 1888
Low, Edward Hamilton, Sudbury Grad. R.M.C. (Kingston).	17th Feb., 1902
*Low, Nathaniel Edward, Sarnia D.L.S.	11th July, 1856
Lumsden, Hugh David, Ottawa, 152 Argyle Ave., C.E., D.L.S., M.I.C.E., Mem. Can. Soc. C.E.	4th Jan., 1866
MacKay, James John, Hamilton	25th Feb., 1899
MacKenzie, William, Sarnia Grad R.M.C. (Kingston).	11th April, 1896
MacKenzie, William Lyon, Can. Nor. Ry., Winnipeg. C.E.	7th April, 1887
McAuslan, Herbert James, North Bay D.L.S., B.A.Sc. (Toronto).	19th Feb., 1906
McCaw, Robert Daniel, Welland D.L.S.	16th Feb., 1907
McColl, Charles Ross, Walkerville, Grad. S.P.S.	4th May, 1909

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
McCubbin, George Albert, St. Thomas, City Engineer's Office Assistant City Engineer.	9th Nov., 1895
McDowall, Robert, Owen Sound Grad. S.P.S., Town Engineer.	11th Nov., 1890
McEvoy, Henry Robinson, St. Mary's D.L.S.	10th July, 1875
McFadden, Moses (not known). D.L.S., P.L.S. (Man.).	13th April, 1858
McFarlen, George Walter, Toronto, City Hall, City Engineer's Office Grad. S.P.S.	11th Nov. 1858
McKay, Owen, Walkerville, Ont., Box 324 M.C.S.C.E., Grad. S.P.S.	7th Jan., 1887
McLean, James Keachie, Ottawa, Dept. Indian Affairs D.L.S.	8th April, 1876
McLean, William Arthur, Toronto, Parliament Buildings A. M. Can. Soc. C. E., Engineer of Highways.	21st Feb., 1898
McLennan, Murdoch John, Williamstown B.A.Sc. (McGill), D.L.S.	13th Nov., 1893
McMullen, William Ernest, Frederickton, N.B. Dept. Crown Lands	11th Nov., 1892
McNab, John Duncan (not known)	9th Oct., 1879
McNaughton, Alexander Lorne, Cornwall	May, 1905
McNaughton, Finlay Donald, Cornwall	25th Feb., 1899
McPherson, Charles Wilfrid, Dawson, N.W.T. Director of Surveys, Yukon D.L.S., Director of Surveys, Yukon.	21st Feb., 1899
McPhillips, George, Winnipeg, Man D.L.S., P.L.S. (Man.).	9th July, 1885
Manigault, William Mazyck, Strathroy, P.O. Box 300	8th July, 1876
Miller, Frederick Fraser, Napanee D.L.S.	8th Jan., 1885
Montgomery, Royal Harp, Prince Albert, Sask. D.L.S.	6th May, 1905

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Moore, John MacKenzie, London, Albion Building	9th Oct., 1879
Moore, John Harrison, Smith's Falls Grad. S.P.S.	11th Nov., 1889
Moore, William James, Pembroke	18th Feb., 1908
Morris, James Lewis, Pembroke D.L.S., C.E. (Toronto Univ.).	7th July, 1886
Mountain, George Alphonse, Ottawa Mem. Can. Soc. C.E., D.L.S., P.L.S. (Que.), Engineer for Railway Commission.	9th Jan., 1884
Murdoch, William, Bowmanville D.L.S., C.E.	10th Jan., 1860
Murphy, Charles Joseph, Toronto, 157 Bay st.	6th Oct., 1886
Nash, Thomas Webb, Kingston D.L.S.	7th April, 1854
Neelands, Ernest Wesley, New Liskeard, Ont. Grad. S.P.S.	16th Feb., 1909
Newman, John James, Windsor	21st Feb., 1898
Newman, William, Windsor, 57 Sandwich st. w. Grad. S.P.S.	12th Nov., 1892
Niven, Alexander. 428 Manning Ave., Toronto. D.L.S.	8th July, 1859
Ogilvie, William, 615 North 18th St., Paris, Texas. D.L.S.	12th July, 1869
O'Hara, Walter Francis, 236 Waverly St., Ottawa. D.L.S.	14th April, 1892
Ord, Lewis Redman, Hamilton, c.o. Traders Bank D.L.S.	8th January, 1885
Parsons, Johnston Lindsey Rowlett, Regina, Sask., Box 1004. D.L.S., Grad. S.P.S.	6th May, 1905
Patten, Thaddeus James, Little Current D.L.S.	5th Jan., 1883
Patterson, Frank Elliott, Sudbury Ont. Grad. S.P.S.	21st April, 1909

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Paulin, Frederick William, Niagara Falls Grad. S.P.S., Toronto.	11th May, 1908
Peckover, Horace Joseph, 209 Major St., Toronto. B.A.Sc., Toronto.	24th February, 1910
Pequegnat, Marcel, Berlin, Ont. B.A.Sc., Toronto	24th February, 1910
Phillips, Henry Percy Argall, Toronto	24th February, 1910
Pierce, John Wesley, Haileybury. D.L.S.	20th Feb., 1909
Pinhey, Charles Herbert, Ottawa, 110 Wellington st. D.L.S., Grad. S.P.S., Assoc. Mem. Can. Soc. C.E.	12th Nov., 1888
Proudfoot, Hume Blake, Saskatoon B.A.Sc. (Toronto Univ.).	6th Jan., 1882
Rainboth, Edward Joseph, Ottawa D.L.S.	11th Nov., 1887
Rainboth, George Charles, Aylmer, P.Q. D.L.S., P.L.S. (Que.).	11th July, 1868
Reinhardt, Carl, Box 303, Cobalt B.A.Sc., McGill.	25th Feb., 1899
Robertson, James, Glencoe Grad. S.P.S.	11th July, 1885
Roger, John, Mitchell Grad. S.P.S.	10th Nov., 1888
Rogers, Richard Birdsall, Peterborough B.A.Sc. (McGill), D.L.S.	9th Jan., 1879
*Rombough, William R. (not known) D.L.S.	14 Nov., 1848
Rorke, Louis Valentine, Toronto, 199 Madison Ave., Inspector of Surveys Grad. S.P.S., D.L.S.	14th April, 1890
Ross, George, Welland A.M. Can. Soc. C.E., B.A.Sc. (McGill), D.L.S.	10th July, 1879
Ross, Kenneth George, Toronto, Ont. Grad. S.P.S.	15th May, 1909
Routly, Herbert Thomas, Haileybury Grad. S.P.S.	1st May, 1907
Russell, Alexander Lord, Port Arthur D.L.S., P.L.S. (Que.).	16th April, 1873
Rutherford, T. N.	18th May, 1906

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
*Scane, Thomas, Ridgetown D.L.S.	7th Jan., 1865
Seager, Edmund, Kenora D.L.S.	8th July, 1861
Sewell, Henry DeQuincy, Toronto, 34 Yonge st. D.L.S., A.M.I.C.E.	9th July, 1885
Seymour, Horace Llewellyn, Edmonton, Alta. D.L.S.	2nd May, 1908
Shaw, John Henry, North Bay Grad. S.P.S.	17th Feb., 1900
Silvester, George Ernest, Sudbury Grad. S.P.S.	12th Nov., 1892
Sing, Josiah Gershom, Toronto, Room 71, Confederation Life Building D.L.S., C.E., Public Works Dept.	9th Jan., 1879
Smith, Angus, Regina Grad. S.P.S., City Engineer.	14th April, 1896
Smith, George, Box 25, Lindsay Engineer for Co. Victoria and four Townships.	7th April, 1881
Smith, James Herbert, New Liskeard	27th Dec., 1904
Smith, Charles Campbell, Observatory, Ottawa. D.L.S.	16th Feb., 1907
Smith, Walter, Lindsay	16th Feb., 1907
Snow, Ernest Arthur, Berlin	18th April, 1910
Speight, Thomas Bailey, Toronto, 703 Temple Building D.L.S.	6th Jan., 1882
Stacey, Albert George (not known) D.L.S.	30th March, 1908
Steele, David Layton, Meaford.	May, 1905
Steele, Ira John, Ottawa	18th April, 1910
*Stewart, George Alexander, D.L.S.	8th July, 1852
Stewart, Lionel Douglas Noble, Collingwood	24th February, 1910
Stewart, John, (address not known) D.L.S.	11th Nov., 1887

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Stewart, Walter Edgar, Aylmer	12th April, 1892
Stull, William Walter, Sudbury B.A.Sc. (Toronto Univ.).	17th Feb., 1900
Summers, Gordon Foster, Winchester Grad. S.P.S., Toronto.	11th May, 1908
Sutcliffe, Homer Wilson, Forest, Ont Grad. S.P.S., Toronto.	11th May, 1908
Taylor, William Verner, Montreal, Sovereign Life Building Grad. S.P.S.	7th Nov., 1896
Tench, William Eastwood, 210 John R. St., Detroit, Mich	11th Jan., 1878
Townsend, David Thomas, C. P. R. Land Dept., Winnipeg. D.L.S., B.A.Sc., Toronto.	17th Feb., 1906
Traynor, Isaac, Dundalk D.L.S.	16th April, 1873
Turnbull, Thomas, Winnipeg, Man., C. N. R. Eng. Office D.L.S., C.E. (Toronto Univ.).	6th July, 1878
Tyrrell, James Williams, Hamilton, Ont. Prov. & Loan Chambers, 7 Hughson St. S. C.E. (Toronto Univ.), D.L.S., Co. Eng. for Wentworth.	8th April, 1885
*Unwin, Charles, Toronto, 126 Seaton st D.L.S., City Surveyor.	12th April, 1852
Ure, Frederick John, Woodstock D.L.S.	7th April, 1887
van Nostrand, Arthur J., Toronto. 703 Temple Building D.L.S.	30th Oct., 1882
van Nostrand, John, Toronto.	1st May, 1910
Waddell, William Henry (not known) D.L.S.	... May, 1905
Wadsworth, Vernon Bayley, Toronto, 103 Bay st. D.L.S.	9th April, 1864
Walker, Alfred Paverley, Toronto, Room 508, Union Station, C. P. Ry., Eng. Office D.L.S., Mem. Can. Soc. C.E.	6th Jan., 1882
Ward, Archeson Thomas. Toronto, 703 Temple Building	10th April, 1897
Warren, James, Walkerton, P.O. Box 190 D.L.S.	7th Oct., 1864

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Watson, John McCormack, Orillia, P.O. Box 224	13th April, 1892
Wells, Arthur Frederick, Sandwich, Ont	17th Feb., 1906
*Wetherald, Thomas, 210 Delatre St., Woodstock D.L.S., C.E.	12th Jan., 1856
Weekes, Abel Seneca, Glencoe D.L.S.	12th April, 1890
Weekes, Melville Bell, Brantford B.A.Sc. (Toronto Univ.), D.L.S.	17th Feb., 1900
West, Robert Francis, Orangeville	7th April, 1881
Wheelock, Charles Richard, Orangeville Treasurer County of Dufferin.	7th Jan., 1886
Whitson, James Francis, Toronto, Dept. of Lands, Forests and Mines	9th Jan., 1886
Wiggins, Thos. Henry, Finch, Ont Grad. S.P.S.	10th Nov. 1891
Wilde, John Absalom, Sault Ste. Marie	9th April, 1893
Wilkie, Edward Thomson, Carleton Place D.L.S.	11th April, 1891
Wilkins, Frederick William, Norwood, Ont D.T.S.	6th Jan., 1877
Williams, David, Port Arthur D.L.S.	9th April, 1864
Wilson, Norman Douglas, 41 Murray St., Toronto. B.A.Sc., D.L.S., A.M. Can. Soc. C.E.	24th February, 1910
*Winter, Henry, Thornyhurst D.L.S., C.E.	11th July, 1853
*Wood, Henry O., Billings Bridge	10th Oct., 1855
*Yarnold, William Edward, Port Perry, P.O. Box 44 D.L.S.	7th April, 1854

REGISTERED AND WITHDRAWN FROM PRACTICE

The names of those who have become "Associates" under By-law No. 89 are marked *; and under By-law No. 45 are marked †.

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Anderson, John Drummond, Trail, B.C.	13th April, 1892
Anderson, William Beaumont, Ottawa, 178 Cartier st. Grad. R.M.C., B.A.Sc. (McGill), M. Can. Soc. C.E., D.L.S.	14th Feb., 1903
Apsey, John Fletcher, (not known) Grad. S.P.S.	6th Jan., 1886
Aylsworth, Charles Fraser, Sr., Madoc D.L.S.	2nd April, 1861
Bowman, Arthur Meyer, Mahan, Beaver Co., Pa. Grad. S.P.S., Staff of U. S. Engineers.	11th Nov., 1887
Bowman, Franklin Meyer, Bellevue, Allegheny Co., Pa. Grad. S.P.S., Engineer Structural Iron Works.	11th April, 1892
Brady, James, Victoria, B.C., P.O. Box 815 M.E.	15th July, 1862
Burnet, Hugh, Victoria, B.C. D.L.S., P.L.S. (B.C.).	5th April, 1887
Cambie, Henry John, Vancouver, B.C. D.L.S., P.L.S. (B.C.).	8th July, 1861
Carbert, J. Alfred, Medicine Hat, Assa. Dist. Eng. and Surveyor.	7th April, 1876
Carpenter, Henry Stanley, Collingwood D.L.S., B.A.Sc., Toronto.	25th Feb., 1899
Chalmers, John, Edmonton, Alta. Structural Engineer, Dept. Pub. Works.	11th April, 1896
*Charlesworth, Lionel Clare, Edmonton, Alta. Grad. S.P.S., Director of Surveys, Saskatchewan, D.L.S.	14th April, 1896

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Coleman, Richard Herbert, Toronto, Can. Co. Offices, Imperial Bank Chambers	6th Oct., 1877
Davis, Allan Ross, 242 Spence St., Winnipeg, Man. B. A. Sc. (McGill).	8th Jan., 1886
Drewry, William Stewart, Ottawa, Dept. of the Interior D.L.S.	5th April, 1883
Ducker, William A., Winnipeg, Man. D.L.S., P.L.S. (Man.), Swamp Lands Comm'r.	6th April, 1882
Edwards, George, Thurso, P.Q. D.L.S.	6th Jan., 1866
*Ellis, Henry Disney, Kuching, Sarawak, Borneo D.L.S., Commissioner of Pub. Works and Surveys.	7th April, 1877
Empey, J. M., Drawer 2081, Calgary. B A.Sc., D.L.S.	16th Feb., 1907
Ford, Wm. Butterton, Wabana, Nfld.	21st Feb., 1898
Galbraith, John, Toronto, School of Prac. Science M.A., D.L.S., Prof. Engineering S.P.S.	13th April, 1875
Gibbons, James, Ottawa, Dept. of the Int. Grad. S.P.S., Dominion Topographical Surveyor.	15th April, 1890
Gibson, George, St. Catharines D.L.S.	10th April, 1860
Gibson, Harold Holmes, Jackson, Kentucky	8th Sept., 1891
*Harris, John Walter, Winnipeg, Man. P.L.S. (Man.), D.L.S., Assessment Com.	6th Oct., 1866
*Harvey, Thomas Alexander, 239 Vernon ave., Long Island, N. Y. City	13th Nov., 1893
*Heaman, J. A. Eng. Dept., G.T.P. Ry., Winnipeg.	
Henderson, Eder Eli, Henderson P.O., Maine Grad. S.P.S.	7th April, 1887
Hermon, Ernest Bolton, Vancouver, B.C. P.L.S. (B.C.), D.L.S.	7th Oct., 1885
Hobson, Joseph, Hamilton, 343 Bay St. S. D.L.S.	3rd Oct., 1855
Innes, William Livingstone, Simcoe C.E. (Toronto Univ.).	14th April, 1892

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Jephson, Richard Jermy (not known). P.L.S. (B.C.), D.L.S.	7th April, 1877
Johnson, Sydney Munnings, Greenwood, B.C.	9th Nov., 1895
Johnston, Robert Thornton, 15 Union Hall St., Jamaica, New York City	9th April, 1889
Kennedy, James Henry, Keremeos, B.C. C. E. (Toronto Univ.), Chief Engineer V. V. & E. R. & N. Co.	7th April, 1887
*Kippax, Hargreaves, Huron, South Dakota. C.E. (Toronto Univ.), Assistant to Surveyor-General.	7th July, 1877
Kirk, John Albert, Revelstoke, B.C. D.L.S., P.L.S. (B.C.).	6th July, 1877
Klotz, Otto, 437 Albert st., Ottawa Dom. Top. Surveyor, C.E. (Mich. Univ.), LL.D.	6th Jan., 1867
Lane, Andrew, Sparrow's Point, Md. Grad. S.P.S., Draftsman Maryland Steel Co.	4th April, 1895
Lendrum, Robert Watt, Strathcona, Alta. D.L.S.	8th Jan., 1874
Livingstone, Thomas Chisholm, (address not known) D.L.S.	10th Jan., 1859
MacLeod, Henry Augustus F., Ottawa, 340 Cooper st. D.L.S., C.E.	11th Oct., 1856
MacPherson, Duncan, Montreal Grad. R.M.C., M.I.C.E., Mem. Can. Soc. C.E., Div. Eng. East Div. C.P.R., D.L.S.	9th Jan., 1884
McCulloch, Andrew, Lake Nelson, B.C. Grad. S.P.S., Assoc. Mem. Can. Soc. C.E., City Engineer.	
McGrandle, Hugh, Huntsville D.L.S.	5th Jan., 1883
McLennan, Roderick, Toronto	20th Jan., 1846
Magrath, Charles Alexander, Lethbridge, Alta. B.A.Sc. (McGill), D.L.S., P.L.S. (B.C.).	1st Nov., 1881
Marshall, James, Blyth. D.L.S.	6th Oct., 1866
Meadows, William Walter, Windsor D.L.S., Grad. S.P.S.	21st Feb., 1898
Miles, Charles Falconer, 268 Triangle st., Buffalo, N.Y.	13th Jan., 1862

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Moore, Thos. Alexander, (not known).	12th Nov., 1892
Morris, Alfred Edmund, (not known).	10th April, 1879
Munro, John Vicar, New York, N.Y., 359 .West 31st st.	9th April, 1895
†Paterson, James Allison. C.E., Mem. Can. Soc. C.E.	5th April, 1878
Pearce, William, Calgary, Alta. D.L.S., P.L.S. (B.C.), Asst. B.C. Land Commissioner for C.P.R.	12th Oct., 1872
Reynolds, Samuel Henry, Winnipeg	17th July, 1880
Peterson, Peter Alexander, Montreal, P.Q. D.L.S., C.E. (Toronto Univ.)	16th July, 1863
Ponton, Archibald William, Macleod, Alta. D.L.S.	9th April, 1880
Purvis, Frank, Mesa City, Arizona	7th April, 1875
Reid, John Lestock, Prince Albert, Sask. D.L.S.	8th April, 1870
Reiffenstein, James Henry, Ottawa, Dept. of the Interior D.L.S.	16th April, 1873
Reilly, William Robinson, (not known). D.L.S., P.L.S. (Man.).	7th April, 1881
Ritchie, Nelson Thomas, Kipiegan, Man. P.L.S. (Man.)	9th Nov., 1888
Roberts, Vaughan Maurice, St. Catharines. D.L.S.	5th April, 1887
Robinson, Franklin Joseph, Regina Grad. S.P.S., D.L.S., Dep. Min. Pub. Works.	21st Feb., 1898
* Ross, Joseph Edmund, (not known) D.L.S., P.L.S. (B.C.).	11th Nov., 1890
Sanderson, Daniel Leavens, Coral, Mich.	4th Oct., 1882
Saunders, Bryce Johnston, Edmonton, Alta— B.A.Sc. (McGill), D.L.S.	7th Jan., 1885
Schwitzer, John Edward, C. P. Ry. ... B.A. Sc. (McGill).	16th Nov., 1896
Shaw, Charles Aeneas, Greenwood, B.C. P.L.S. (B.C.).	6th Oct., 1877
Sherman, Ruyter Stinson, Mission City, B.C. P.L.S. (B.C.).	12th April, 1890
Smith, Henry, Toronto, Dept. of Lands, Forests and Mines D.L.S., Mem. Can. Soc. C.E.	8th Nov., 1861

NAME AND P.O. ADDRESS.	DATE OF ADMISSION BY BOARD.
Stewart, Elihu, Ottawa, Dept. of Interior D.L.S., Chief Inspector of Forestry.	8th April, 1872
*Stewart, Louis Beaufort, Toronto, School of Prac. Science Dom. Top. Surveyor, Professor of Surveying.	6th April, 1882
Tracey, Thomas Henry, (not known). C.E., P.L.S., (B.C.), D.L.S.	8th April, 1870
Vicars, John Richard Odlum, Kamloops, B.C. P.L.S. (B.C.), D.L.S.	5th Jan., 1887
Wallace, Charles Hugh, 36 Dame St., Dublin, Ireland C.E., (Trin. Coll. Dublin), Dom. Top. Surveyor.	9th Nov., 1889
Wallace, James Nevin, Calgary, Alta. D.L.S., B.A., B.E. (Trin. Coll., Dublin).	21st Feb., 1898
Wheeler, Arthur Oliver, Calgary, Alta. P.L.S. (B.C.), D.L.S., Topographer, Dept. of Interior.	8th July, 1881
Wicksteed, Henry King, Cobourg D.L.S., C E	7th Jan., 1886

SUMMARY.

Active members subject to dues	237
Active members exempted from dues	13
Withdrawn from practice (including nine Associates)	79
Dead	77
Total number enrolled since incorporation	406

DECEASED MEMBERS.

NAME	LATE RESIDENCE.	DATE OF P.L.S. CERTIFICATE.	DATE OF O.L.S. REGISTRATION.	DIED.
Abrey, George Brockitt	Toronto Junction	10th January, 1860	1892	25th June, 1906.
Aylsworth, William R.	Belleville		8th November, 1861	22nd April, 1909.
Barrett, Russell H.	Pembroke		14th February, 1903	30th January, 1905.
Bigger, Samuel Howell	Ottawa		20th January, 1904	7th July, 1906.
Bolger, Francis	Lindsay	10th October, 1863	1892	3rd November, 1895.
Bolger, Thomas Oliver	Kingston	6th July, 1865	1892	——— ———
Bolton, Jesse Nunn	Toronto	6th April, 1867		——— ———, 1901.
Bolton, Lewis	Listowel	9th July, 1864	1892	18th July, 1910.
Bowman, Leander Meyer	Toronto	14th April, 1892	1892	20th September, 1895.
Bray, Edgar	Oakville	6th October, 1866	1892	——— ———, 1908.
Brown, David Rose	Cornwall	10th October, 1850	1892	14th May, 1900.
Burke, William Robert	Ingersoll	5th April, 1878	1892	10th June, 1897.
Byrne, Thomas	Sault Ste. Marie			——— ———
Caddy, Cyprian F.	Campbellford	10th July, 1860	1892	——— August, 1905.
Caddy, Edward C.	Cobourg	18th December, 1846	1892	26th September, 1897.
Cheeseman, Thos.	Mitchell	11th July, 1856.	1892	——— ———, 1905.
Coad, Richard	Glencoe	8th October, 1879	1882	17th May, 1897.
Creswicke, Henry	Barrie	8th July, 1864	1892	22nd January, 1898.
Cromwell, Joseph M. O.	Perth	1st October, 1846	1892	19th October, 1897.
Davidson, Walter Stanley	Sarnia	9th April, 1884	1882	December, 1900.
Davis, John	Alton	5th April, 1878	1892	8th November, 1907.
Deane, Michael	Windsor	26th May, 1848	19th December, 1882	3rd April, 1897.
DeGurse, Joseph	Windsor	5th April, 1883	1892	22nd March, 1898.
Dobbie, Thos. Wm.	Tillsonburg	11th July, 1856	1892	——— ———, 1908.
Doupe, Joseph	Winnipeg		13th January, 1863	——— ———, 1910.
Filmore, Stanley H.	St. Thomas		17th February, 1902	16th June, 1904.
FitzGerald, James William	Peterborough	13th July, 1857	1892	——— ———, 1901.
Foster, Frederick Lucas	Toronto	9th April, 1863	1892	27th July, 1899.
Fowlie, Albert	Orillia	13th January, 1863	1892	——— April, 1898.
Fraser, Charles	Wallaceburg	5th August, 1847		——— ———, 1905.
Gibbs, Thomas Fraser	Adolphustown	31st May, 1841	1892	17th April, 1893.

NAME	LATE RESIDENCE.	DATE OF P.L.S. CERTIFICATE.	DATE OF O.L.S. REGISTRATION.	DIED.
Gibson, James Alex.	Oshawa	7th April, 1855	1892	—— ——, 1908.
Gilliland, Thomas Brown	Eugenia	11th July, 1868	25th January, 1890	14th December, 1898.
Gilmour, Robert	Toronto	11th April, 1856	1892	29th December, 1903.
Hanning, Clement George	Preston	19th July, 1858	1892	7th May, 1905.
Haskins, William	Hamilton	5th July, 1855	1892	5th July, 1896.
Hermon, Royal Wilkinson	Rednersville	13th July, 1857	1892	9th February, 1907.
Hewson, Thomas Ringwood	Hamilton	6th July, 1877	1892	21st October, 1898.
Holland, Wm. Hugh	Toronto		1907 1st May	—— ——, 1908.
Howitt, Alfred	Gourock	12th January, 1856	1892	6th May, 1896.
Irwin, James Moore	Rat Portage	13th January, 1863	1892	—— ——, 1908.
Kains, Tom	Victoria	11th July, 1873		—— ——, 1901.
Kirk, Joseph Green	Stratford	16th February, 1843	1892	22nd January, 1900.
Lynch-Staunton, Francis H.	Hamilton	11th October, 1856	1892	11th June, 1899.
Macdougall, Allan Hay	Port Arthur	4th April, 1859	1892	—— February, 1906.
MacMillan, James Alexander	Calgary	6th January, 1877	24th December, 1894	—— ——. 1898.
MacNab, John Chisholm	Hamilton	8th January, 1880	1894	16th October, 1897
McAree, John	Toronto	6th April, 1867	1894	12th December, 1903
McCallum, James	Fort Francis	30th March, 1849	1894	—— July, 1900.
McDonel, Augustine	Chatham		1892	—— ——, 1908.
McGeorge, Wm. Graham	Chatham	8th January, 1866	1892	1st July, 1906.
McKenna, John Joseph	Dublin	9th July, 1860	1892	22nd September, 1910
McLatchie, John	Nelson, B. C.	9th January, 1864	1892	3rd February, 1908.
Malcolm, Sherman Morgan	Blenheim	81th October, 1858	1894	13th January, 1899.
Ogilvie, John Henry	Rat Portage	1th April, 1876	24th April, 1894	21st September, 1898.
Pedder, James Robert	Doon	10th November, 1891.	23rd December, 1892	17th January, 1897.
Pope, Robert Tyndal	Ireland	13th April, 1875		—— ——, 1905.
Proudfoot, Hart William	Saskatoon, Assa.	6th May, 1905		31st March, 1906.
Reid, James Hales	Bowmanville	6th October, 1866	1892	22nd December, 1899.
Robinson, William	London	—— May, 1846	1892	11th October, 1894.
Rubidge, Tom S.	Cornwall	9th February, 1849	1892	—— June, 1904.
Sankey, Villiers	Toronto		1892	10th July, 1905.
Schofield, Milton C.	Guelph	28th September, 1843.	1892	19th February, 1908.
Selby, Henry Walter	Toronto	8th January, 1876	1892	23rd August, 1910

Simpson, George Albert	Winnipeg	7th October, 1864	1892	8th January, 1905.
Spry, W.				—— ——, 1906.
Squire, Richard Herbert	Brantford	14th April, 1896	1896	—— ——, 1908.
Steele, Edward Chas	Sault. Ste. Marie	9th April, 1889	1892	—— ——, 1908.
Strange, Henry	Rockwood	30th November, 1838.	1892	March, 1908.
Strathern, John	B.C.	5th October, 1876	1892	—— ——, 1897.
Tiernan, Joseph Martin	Tilbury Centre	7th January, 1886	1892	—— December, 1900.
Thomson, Augustus Clifford	Chicago	14th January, 1861	1892	—— December, 1896.
Van Buskirk, William Fraser	Stratford	7th April, 1883	1892	30th January, 1905.
Wagner, William	Ossowo	13th April, 1858		—— ——, 1901.
Walsh, Thomas William	Simcoe	25th April, 1842	1892	14th March, 1895.
Wheelock, Charles John	Orangeville	—— ——, 1856	1892	4th July, 1897.
Willson, Alfred				20th May, 1906.

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